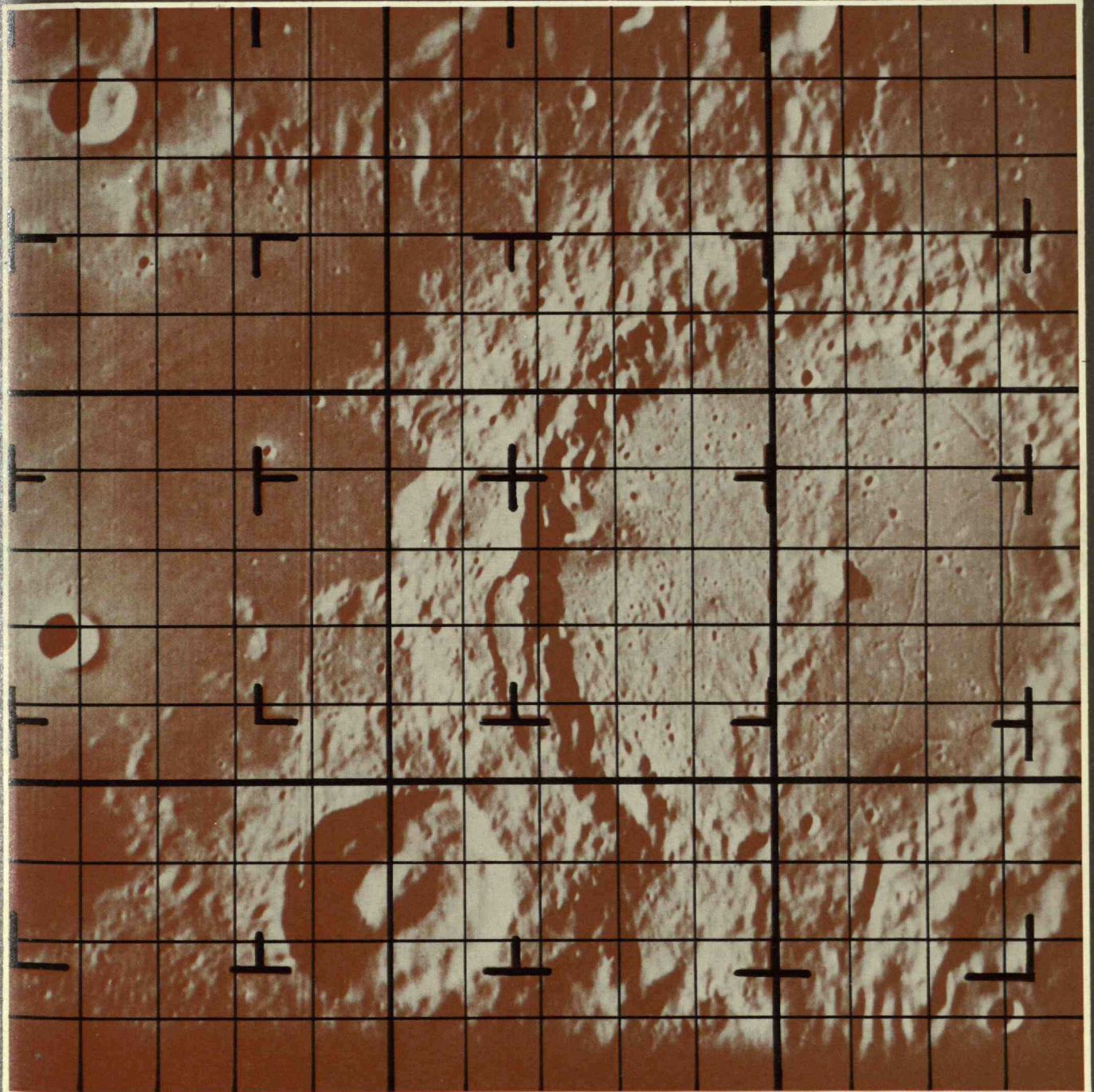


Technology Review

Edited at the Massachusetts Institute of Technology

July, 1967

Industrial Management
in the Communist State, *page 17*



The Moon Before Apollo

technology review

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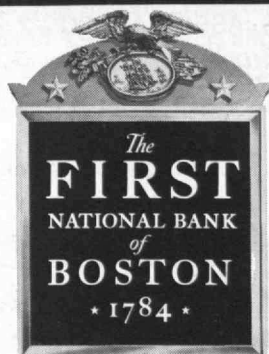
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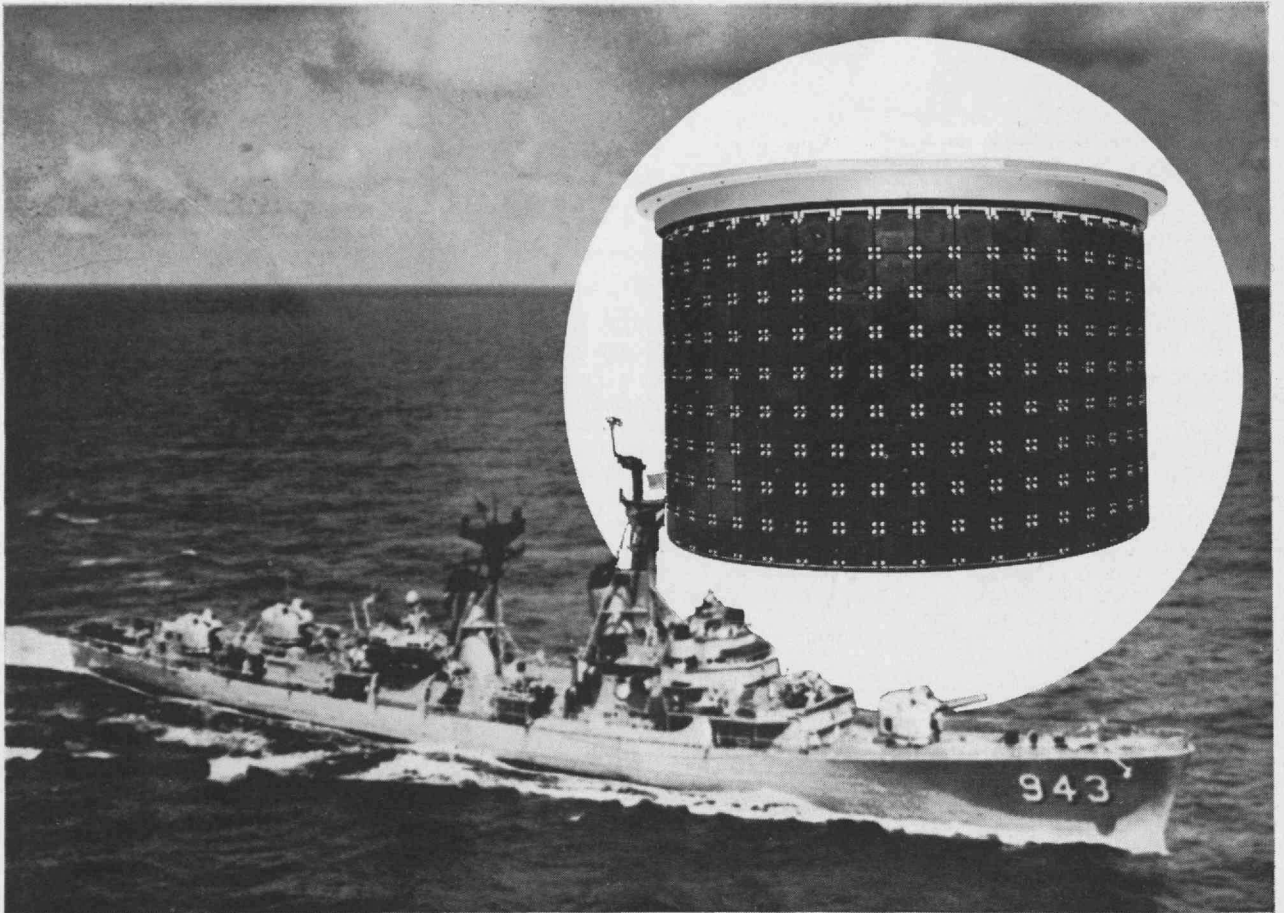
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The cover presents a representational view of the Moon, showing a radar grid superimposed on a *Ranger 9* photograph taken at an altitude of 430 kilometers above the lunar surface. John C. Noyes writes on our current knowledge of Earth's only natural satellite on page 23. Cover design by Barbara Hawley.

This issue completes Volume 69 of Technology Review. The nine monthly issues of Volume 70 will commence with November, 1967, to be published late in October. An index to Volume 69 will be available after September 1, 1967; requests should be made to Technology Review at Room E19-430, M.I.T., Cambridge, Mass., 02139.




Is the stainless steel automobile here to stay?

Back in 1936, Allegheny Ludlum put a special, stainless steel body on a Ford V-8. Now, after 500,000 miles and thirty years of weather, washing, and hand-pats from admirers, it looks as good as new. Then, in 1960, we had a Thunderbird built of stainless. During the past seven

years, it has aged hardly at all. And just recently, a stainless steel body was commissioned by A-L for a 1967 Continental. Its chances of long life seem pretty good.

These cars are kept busy touring the country as dramatic reminders of the advantages of stainless steel

in a growing number of applications — trim, wheelcovers, window surrounds, and internal functional components. We think they'll be here to stay for a good long time. The Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh, Penna. 15222. 

Allegheny Ludlum

Genetics: Facts, Nonfacts

By Robert C. Cowen, '49

Maybe people weren't a good idea to begin with. This comment is sometimes made facetiously when discussions of the new genetics get too serious. Yet it has a point. It burlesques the kind of issue men must face if they are to take control of human evolution at the fundamental level of their genetic makeup, a prospect which genetics now seems to hold out.

In what direction do we want to channel that evolution, if indeed it is wise to channel it at all? Human betterment is a high-sounding goal. But what does it mean? For that matter, what exactly is the human condition which we might try to better?

Scientists and laymen alike are ignorant when it comes to such questions. In the past, this didn't matter very much. The forces of evolution swept us along whether we understood them or not. But with the prospect of taking control of these forces ourselves, the need to know has become imperative.

This was brought home to me during a round table discussion between geneticists and science writers last month. It was sponsored by Columbia University's new Institute for the Study of Science in Human Affairs. The fledgling Institute couldn't have found a better subject to illustrate how unprepared we are to come to grips with the human implications of our fast-developing science and technology.

Clear and Unambiguous

When it came to the purely technical implications of their work, the geneticists were clear and to the point. For example, Marshall Nirenberg, head of the section of biochemical genetics of the National Institutes of Health, pointed out that geneticists have broken the genetic code. They know to a considerable extent what sequences of chemical units in the basic genetic material determine what proteins will be made in living cells. This protein manufacture in turn governs the development of organisms.

Also, Dr. Nirenberg noted that it now is possible to alter the code in simple ways and to have this altered code passed on to succeeding generations. So far, all of this pertains only to certain bacteria and viruses. These simple organisms are far removed from higher animals. Yet such is the faith of biologists in the unity of life that Dr. Nirenberg expressed conviction

that experiments with these simple creatures point to similar possibilities with more complicated plants and animals. He thinks it is only a question of time, perhaps 20 to 30 years, before the deliberate change of basic genetic material will be possible with man.

No one at the round table seriously challenged this. Professor Bentley Glass of the State University of New York did take mild issue. But it was only with tactics, not with the awesome possibilities. Dr. Glass feels that genetic engineering of the Nirenberg variety is rather blue sky speculation. Besides, he said, it may well turn out to be impractical. He sketched several technical difficulties in altering a few genes and then trying to introduce the new genetic material into the line of human reproduction.

It would, he thinks, be easier and more satisfactory to cultivate parts of ovaries and testes in the laboratory. From these, eggs and sperm could be bred to specification. These could then be used to start development of embryos which, at an early stage, could be implanted in women. All of this, he said, is fully implicit in laboratory studies today.

Parallel to such a development would be the rise of simple clinical tests for spotting genetic defects in prospective parents. In cases where defective children are likely, Dr. Glass suggested, the parents might resort to prenatal adoption. In this, an implanted "test tube" embryo from proven stock would take the place of a naturally generated embryo. It could also be substituted for a natural embryo found to be defective in post-conceptual examination. In either case, the parenthood that would result would be virtually a natural one.

While there is much more to this side of the story, this makes the point. Whatever specific techniques may be, the next several decades are likely to give us the technology to influence substantially the course of our evolution by controlling the genetic makeup of our children.

A Morass of Ignorance

The main question is what do we do about it? Do we ignore this capability—an unlikely prospect? Or do we use it? And if we use it, how do we do so and decide what we do with it? It was at this point that the round table left the well-charted land of contemporary genetics and wandered into a morass of ignorance. There is not enough of the right kind of scientific knowledge to tackle meaningfully the value judgments such questions involve.

The situation is reminiscent of that of the 1950's when scientists tried to assess the genetic dangers of radioactive

fallout. The rate of production of fallout due to testing could be measured. But there was relatively little pertinent knowledge of radiation-induced mutation. There was practically no knowledge of how fallout contaminated the environment or of how the hot material moved through food chains. Ignorant in these critical areas, the scientific advisers could only guess at the genetic implications.

So it is with the developing art of genetic control. The practical know-how is growing fast. Yet geneticists know very little about the human gene pool with which they propose to work. Professor Paul Marks of Columbia's College of Physicians and Surgeons noted that many genetic factors underlying human disabilities now are coming to light. No one knows how these are distributed in the population, how they are building up in the gene pool or dying out.

Moreover, little is known about how such seemingly defective genes relate to man's total genetic structure, how they fit into the general pattern of well-being in given environments and under various stresses. It could be that, were some of the "bad" genes eliminated, the human race might be less vigorous and adaptable in general.

One of the first things to do to learn more about this is to define better man's genetic makeup. Dr. Marks said that a few million dollars would fund a meaningful study along this line for the United States right now. Yet he and his colleagues have so far been unable to interest research-supporting agencies in underwriting such a study.

Certainly there are grave moral implications to genetic engineering. Is such molecular manipulation to be voluntary or compulsory? What evolutionary direction is it to take? Do we want even to experiment with it or to leave it strictly alone? Who is to decide such issues? Will it be politicians in legislatures or acting as dictators with the advice of a committee of technocrats? Or will national and world public opinion gradually crystallize around certain courses of action as the issues are more widely debated over the decades?

These are solemn questions that we all must face over the next 20 years. Yet they are meaningless if we lack the scientific information to give a factual base to our thinking. That is why there is an urgent need today to undertake the research that will at least enable us to know where we are genetically and what our present evolutionary course seems to be. Perhaps indeed people were a poor idea from the beginning. But we won't find that out until we know, genetically, what man really is.

Materials testing: today's growth technology.

Since the end of World War II, materials research and development has become a priority technology. Its growth has been marked by a new language: viscoelastic properties, complex modulus, tensile energy absorption, rheology — the terminology of the space age. And its growth has been marked by an ever increasing need for imaginative materials researchers together with versatile, precise test equipment matched to their advanced needs.

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Review on Books

Summer Miscellany

By Joseph Mindel

A well-known property of the space-time continuum, ruefully acknowledged by readers of books and writers about books, is its everlasting insufficiency. To make the most of what is available, this column is devoted to brief consideration of several books that might otherwise escape notice.

People

With characteristic disregard of the customary intimations of mortality, Bertrand Russell has produced in his 95th year a first volume of memoirs. *The Autobiography of Bertrand Russell* (Atlantic-Little, Brown, Boston, 1967, 356 pp., \$7.95) describes his early years, ending at the start of the Twentieth Century with the writing of *Principles of Mathematics*, which established his reputation. The self-conscious individuality and total independence from which flow the originality of his mathematical and philosophical thought, may also be the roots of his defiance of social norms, in such related roles as pacifist, socialist, opponent of organized religion, and advocate of free love. The book, consisting of a narrative and collections of contemporaneous letters, two perspectives separated by more than half a century, is honest, lively, and uninhibited.

Niels Bohr (Wiley, New York, 1967, 355 pp., \$9), Stefan Rozental, editor, is a collective book about "his life and work as seen by his friends and colleagues." The contributions by such figures as Heisenberg, Frisch, Weisskopf, and Dirac, among others (two of whom are on the M.I.T. Faculty), are firsthand reports of the development of quantum theory. These personal, informal recollections constitute the raw material of history, which will no doubt be evaluated by future historians. The essays yield glimpses of Bohr from different viewpoints, providing a portrait framed in respect and affection.

Most of those who visited Goethe to look upon greatness were moved to write down what they saw and heard. A few came and stayed, like Eckermann, who as an unofficial, unpaid editorial assistant revolved around Goethe, pen in hand. From Eckermann's *Conversations with Goethe* and other sources, David Luke and Robert Pick have selected and translated a generous sampling in *Goethe: Conversations and Encounters* (Regnery, Chicago, 1966, 263 pp., \$6). From

his words, filtered through the memories and understanding of many listeners, a coherent, shimmering portrait of Goethe emerges. This was a man!

Goethe wrote a series of cryptic quatrains in the form of riddles. In *The Soothsayings of Bakis: Goethe's Tragi-Comic Observations of Life, Time and History* (Johns Hopkins, Baltimore, 1967, 85 pp., \$4.95) German and English versions appear together, with interpretations by Harold Jantz who also translated the poems.

"The Big Sail," set in McDermott Court on the M.I.T. campus, is a 40-foot-high steel sculpture—a stabile—by Alexander Calder, who is better known for his delicately balanced, gyrating mobiles. Calder has not always worked on so grand a scale, as is evident from *Calder* (Van Nostrand, New York, 1966, 208 pp., \$15) by H. H. Arnasm and P. E. Guerrero. His drawings and wire sculptures share with some of the mobiles a mischievous quality that makes them especially appealing. Calder's artistic development is traced by the text of this handsomely illustrated book.

Places

On August 24, 79 A.D., Mount Vesuvius erupted, burying Herculaneum under 60 feet of hot mud lava. In *Herculaneum* (Crowell, New York, 1966, 174 pp., \$6.95) Joseph Jay Deiss describes the catastrophe as related in contemporary reports, the accidental discovery of the buried city centuries later, and the still-continuing excavations of the marvelously preserved remains. The story is not new, but this vivid re-telling, with many illustrations, reconstructs in such detail the life of a city that it almost seems as if its people are about to return after 1900 years.

Hutchins Hapgood's *The Spirit of the Ghetto*, with drawings by a young, unknown artist, Jacob Epstein, which appeared in 1902, has been re-issued (Harvard, Cambridge, 1967, 315 pp., \$5.95), edited, with an introductory essay, by Moses Rischin. If Hapgood's book actually were the sociological work he may have thought it was, this description of the Jewish community of New York's Lower East Side 65 years ago might seem old-fashioned today. But Hapgood, who was of the generation of Lincoln Steffens, Jacob Riis, and John Reed, wrote a human, literary document that conveys the essence of other times and other people.

It is not entirely a play on words to assert that the locale of Fred Reinfield's *Great Games of Chess Prodigies* (Macmillan, New York, 1967, 246 pp., \$5.95) is the chessboard. To chess masters, particularly when they are young and great, the boundaries of the

64 squares of the board are probably more real geographically than the place where the board happens to be set down. Entering into a world of another reality is part of the attraction of the book. These annotated games of Morphy, Capablanca, Reshevsky and Fischer demonstrate that in chess, the style is the man.

Reflections

Think Back on Us (Southern Illinois University, Carbondale, 1967, 416 pp., \$10) is a collection of essays by Malcolm Cowley, edited by Dan Piper. Subtitled "A Contemporary Chronicle of the 1930's," the book consists of articles, chiefly literary criticism and critiques of the times, from the *New Republic*. Those who lived through the Thirties will find them re-created in the books, plays, movies, and events discussed by the author. To those who did not, the vicarious return via Mr. Cowley's analytic eye and incisive prose is worth making.

In *Beyond the Observatory* (Scribner, New York, 1967, 222 pp., \$4.50) Harlow Shapley, emeritus director of the Harvard College Observatory and an emeritus life member of the M.I.T. Corporation, addresses the general reader. He discusses the 10 most significant scientific achievements of the Twentieth Century, the possibility of life on other planets, and the information that can be gleaned from the light of a distant star. He also examines the Book of Job for its science as well as its poetry, inquires about religion in the cosmic picture, and urges the scientist to go outside his laboratory. In these essays, Professor Shapley, a leading figure in astronomy for more than 30 years, has not hesitated to go beyond the observatory.

Themes and Episodes (Knopf, New York, 1966, 352 pp., \$6.95) by Igor Stravinsky and Robert Craft contains letters, notes, and articles by the composer and excerpts from the diaries of his associate. The master of modern music flings about him with magnificent ruthlessness and a razor-edged pen. He likes unusual words and phrases (perdurability, a scrannel murmur), and a few of his contemporaries. He dislikes reviewers, to whom he writes letters undoubtedly responsible for their cinereous complexions; many orchestra conductors, for reasons that he gives in detail; and the Boston weather. ("I was also fleeing Boston, whose only seasons . . . were winter and the Fourth of July. . . .") The larger-than-life public self-portrait that Igor Stravinsky projects should not be permitted to overshadow his historical sense and critical acumen, of which this book gives sufficient evidence.

The MIT Faculty past and present projected into the future and beyond the campus through the MIT Press

— the folly of "bossism"; overdirected workers, excluded from real participation in their organizations, are underproductive and feel themselves restricted to the treadmill of merely economic motivation. McGregor's style of writing, like his style of management, is deft, suggestive, warm, and light-handed. \$6.95

Men, Machines, and Modern Times

by Elting E. Morison,
Sloan Fellows Professor of Management

The conflict between man's hope for the future and man's fear of change is here traced from the introduction of the automated loom early in the nineteenth century to the mechanical and managerially automated businesses of today. Professor Morison shows that resistance and confusion have been constant reactions through the years. \$5.95

Management Thought and Action in the words of Erwin H. Scheil, edited by Herbert F. Goodwin and Leo B. Moore

Late Professor of Industrial Management at MIT, Scheil's work bears the peculiar stamp of his personality to the extent that it is almost impossible to decide which of the two, work or character, is the more significant contribution to a given field. As is the case with the late Erwin H. Scheil, these writings demonstrate, Professor Scheil sought to bring into clearer perspective the totality of the manager's human experience and responsibility." \$7.50

Electrons, Ions, and Waves: Selected Papers of William Phelps Allis, Professor of Physics, Emeritus

The selected papers of William Phelps Allis are gathered here in celebration of his elevation from Professor to Professor of Physics, Emeritus, at the Massachusetts Institute of Technology. This gathering was arranged as a surprise tribute to Professor Allis and was prepared under conditions of conspiring silence. The presentation was held at M.I.T. on May 10, 1967. The papers selected here are a worthy extension of the man himself, in their directness and essential simplicity, and in their abiding value. \$20.00

Leadership and Motivation: Essays of Douglas McGregor, Late Sloan Fellows Professor of Management

edited by Warren G. Bennis and Edgar H. Schein, with the collaboration of Caroline McGregor
One of the developers of modern industrial psychology points out — among other things

Science and the Educated Man by Julius A. Stratton, Former President, M.I.T.

Addressed to the whole body of educated men, these speeches and talks from the decade 1955-1965 were originally prepared for delivery before administrators and managers, educators and students, scientists and engineers, and the general public. Indeed, their chief concern is with the increasing intersection of the fields of activity of these once-divergent groups. He feels that although a *détente* has been established between the "two cultures," a free trade of ideas is still a distant hope. This central theme is clearly sounded in the title address: "We must allow no gulf to grow between scientists and the great body of educated people. The education of scientists and engineers is now too serious a matter to remain wholly the concern of the profession itself. The liberal education of all people is a matter of equal moment to us as scientists." \$5.00

When M.I.T. Was "Boston Tech": 1861-1916 by Samuel C. Prescott, Late Dean of the School of Science

This book, happily, is more than formal history. It is a personal report, an essay in interpretation and remembrance that is important both for what it tells about M.I.T.'s first half-century and about what the late Dean Prescott found important and interesting in that half-century. This book is a testament of faith in an institution, an earnest of the author's abiding belief in the staff, students, and alumni. Royalties from the sale of this volume have been assigned by Dean Prescott to the M.I.T. Alumni Fund. \$8.00



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The Negro Colleges

By Corbin Gwaltney

They are relatively small in number—only 123 of the more than 2,200 institutions of higher education in the United States. Except for one factor, they differ greatly, one from another. But that factor, in this day and age, is more than sufficient to make the 123 institutions a matter of deep concern.

These are the nation's predominantly Negro colleges and universities. In an era of racial integration, they have this characteristic in common: their student bodies are composed almost entirely of Negroes.

For the most part, the institutions—their administrators, their faculties, and their students—seem to prefer it that way. They resent suggestions that, in a period in which most forms of segregation are systematically being eliminated from American life, a "predominantly Negro" college or university is an anachronism.

All this is contrary to the predictions of many educational leaders, following the 1954 decision of the Supreme Court on segregated schooling, that the days of the predominantly Negro colleges were numbered. More than a decade later, the fact is—even as more and more Negroes are enrolling in colleges and universities that once were predominantly white—the majority of Negro college students still attends predominantly Negro institutions. And, it appears certain, this situation is likely to persist for years to come.

Why?

- One reason has been the reluctance of many white institutions in the South to desegregate. On many campuses, integration today could only be described as "token."
- Another is the fact that active recruiting of Negro students by the colleges and universities in the North and West is a fairly recent phenomenon.
- Another is the poor preparatory education received in the elementary and secondary schools by many Negroes. With such an education, they cannot meet the entrance requirements of many colleges and universities.
- Another is the high cost of higher education at many major institutions—a cost beyond the reach of poverty-stricken Negroes.
- And another is the hesitancy of many Negroes to enter what they consider to be white territory, to endure the loneliness (and sometimes the hostility) encountered there.

Hence the predominantly Negro in-

stitutions, concentrated in the South, have continued to be the places to which the majority of college-bound Negroes apply.

To Segregate or Integrate?

"These colleges are essential today, segregated as many of them are," says the president of one of them, Atlanta's Morehouse College. "And they will be needed in the nonsegregated tomorrow."

Elsewhere in American higher education, this view has its strong supporters. It also has its critics.

The latter urge that the Negro colleges try to attract more white students, thus becoming racially integrated. Sometimes this suggestion is coupled with the implication that, by so doing, the Negro institutions might be taking the first step toward improving their academic quality.

"I am not willing to consider the enrollment of white students the major criterion of the quality of work in a predominantly Negro college," Benjamin E. Mays, the President of Morehouse College, has said.

A major study of the predominantly Negro colleges was conducted, several years ago, by Earl J. McGrath of Columbia University Teachers College. "Contrary to the proposal for disestablishment," Dr. McGrath concluded, "a deliberate weighing of the evidence in this study leads to the conclusion that most of the predominantly Negro institutions ought to be preserved and strengthened. . . ."

Recently, a differing view was published in the *Harvard Educational Review*. David Riesman, the Harvard sociologist, and Christopher Jencks, Institute for Policy Research, wrote:

"To the extent that Negroes seek entry into a racially integrated, national society, they will tend to seek out colleges which provide anticipatory socialization for such life.

"Some traditionally Negro colleges will try to provide this socialization by attracting white students and becoming indistinguishable from other institutions of higher learning. Most, unable to attract whites, will remain overwhelmingly Negro for the foreseeable future.

"Such colleges will educate mostly Negroes who will work behind the wall of segregation. . . ."

The authors suggested that such marginal institutions might be wise "to stop competing with better-situated colleges, white or Negro, and start competing with the still woefully inadequate secondary schools."

The Riesman-Jencks article did not draw applause from most Negro educators. "Extremely paternalistic," was one comment. A rebuttal, written by

the President of the United Negro College Fund, Stephen J. Wright, is reported to be scheduled for publication in the fall issue of the *Harvard Educational Review*.

Toward Effective Competition

Meanwhile, on the undoubtedly correct assumption that the predominantly Negro colleges will continue to educate a large segment of the Negro student population for years to come, some significant steps are being taken to strengthen them.

In mid-June, for example, the National Association of Land-Grant Colleges and State Universities, in co-operation with the Council for Financial Aid to Education, sponsored a workshop for the presidents and fund-raising officers of predominantly Negro institutions, to help them develop better ways of raising money.

On the academic side, next fall a group of distinguished economists, including professors from major universities, will conduct seminars and student-faculty consultations on the campuses of a number of predominantly Negro institutions. And—a sign of the growing interest in such institutions on the part of concerned educators—John U. Monro is leaving his deanship of Harvard College to direct freshman studies at Miles College, a predominantly Negro institution in Alabama.

Ironically, one such activity on the part of a number of leading U.S. universities and colleges may actually be complicating the task of the predominantly Negro colleges as they seek ways of upgrading themselves, academically.

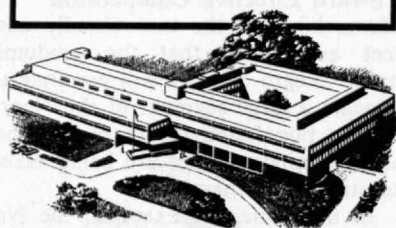
This is the intensified effort, by many institutions in the North, Midwest, and West, to recruit more Negroes for their own student bodies. Today large amounts of scholarship aid are available to young and promising Negroes who attend such institutions.

All this, say some observers, tends to lure the ablest Negro students away from the predominantly Negro institutions—leaving those institutions the less-qualified young people and thus perpetuating their academic problems. Others share the view of the President of Hampton Institute, Jerome Holland:

"Most of us welcome this competition as being precisely what the Negro youth of America needs. How good it is for these young people to be the objects of competition, and how healthy for those of us who serve two-thirds of the Negroes in college to have this competition!"

The author is editor of The Chronicle of Higher Education, a newspaper for college and university administrators and faculty members.

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Puzzle Corner

By Allan J. Gottlieb, '67

Unfortunately, there is no issue of *Tech Engineering News* corresponding to the July TR. Therefore, in order to avoid confusion next year, I shall not print any new problems this month.

Several readers have asked what will happen to Puzzle Corner next year when I go to Brandeis. By popular request (i.e., from the editor and my mother), the column shall remain in my hands for at least one more year. I should again like to thank everyone for their concern.

John B. Joseph, '51, claims that the answer given for the "seven cigarettes" problem (#15) is wrong—the cigarette just cannot be made to touch as illustrated (Technology Review for March). It still looks right to me, but I would welcome hearing anyone else's opinion.

Solutions

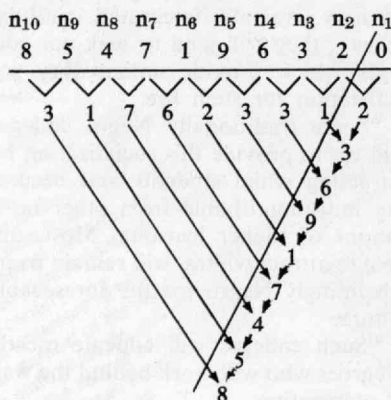
68—Insert the remaining digits 7, 8, and 9 into the proper place in the following sequence:

—, 5, 4, —, 1, —, 6, 3, 2, 0.

The intended sequence was one determined by alphabetically ordering the words one, two, etc. This solution was found by George H. Ropes, '33. Eric Rosenthal, and Douglas Hoylman, '64. Benson P. Ho, '70, found a rather different correspondence. Its complexity is rivaled only by the difficulty the printer will have in setting the type:

From Mr. Ho:

My solution to problem 68 is: 8, 5, 4, 7, 1, 9, 6, 3, 2, 0. I think it's easier to draw than to explain it:



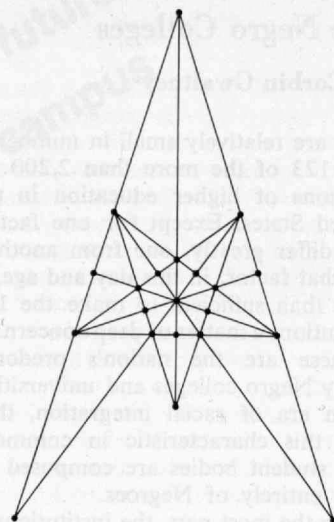
Key:

- ✓ —subtraction: $n_i - n_{i-1}$; if it is less than 0, then add 10 to it.
- ↘ —addition: add the two directed numbers; if their sum is greater than 10, subtract 10 from it.

69—Arrange 21 points so that they form 12 lines each having precisely 5 points.

The following artistic endeavor is

from Ann Giffels, musician, the daughter of John E. Giffels, '14:



Also solved by Messers. Ropes and Joseph.

70—Find a relation among the betti numbers of the homology of a compact orientable non-bounded n -dimensional manifold. Do the same for the corresponding torsion subgroups. A hint: compute many "simple examples." Proofs were not required.

In case anyone is interested, $\beta_1 = \beta_{n-1}$ and $T_1 = T_{n-1-1}$.

71—Thomas F. Hickerson, '09, would like to know the minimum integral values of A, B, and C such that $A(A + 8) = B(B + 28) = C(C + 34)$.

Many readers solved this by brute force. One elegant solution was sent in by Neil K. Cohen, '69:

Let $B(B + 28) = C(C + 34)$
(Note that $C < B$, since x^2 is an increasing function and everything is integral.)

$B^2 - C^2 = 34C - 28B$
 $B^2 - C^2 = (6C) + 28(C - B)$
 $(B + C)(B - C) = (3)[(C - B) + (B + C)] + 28(C - B)$

Let $x = B - C$, $y = B + C$. Then

$xy = 3(y - x) - 28x$

$x(y + 31) = 3y$.

Since everything is positive and

$y + 31 > y$, $x < 3$.

If $x = 0$, $y = 0$, $B = C = 0$, illegal.

If $x = 1$, $2y = 31$, illegal.

Therefore $x = 2$, $y = 62$ and $B = 32$ and $C = 30$.

$A^2 + 8A = (32)(60)$.

$A = \frac{-8 + \sqrt{64 + (4)(32)(60)}}{2} = 40$.

This must be the unique as well as minimal solution since 2 is the only possible value of x .

Also solved by Messers. Roper, Joseph, and Rosenthal, Thomas B. Jabine, '48, Mark H. Yu, '70, and Mrs. Marion Giffels (Do you have a daughter Ann?).

72—Arthur Mohan, '08, sent in the following problem:

In how many ways may "m" different

blue books and "n" different red books be arranged on a shelf so that no two of the red books are together? What inequality must "m" and "n" satisfy? This is supposed to be solved without the use of any theory of groups or sets.

According to Mr. Mohan, a text he has used gives the answer as $m!(m+1)/(m-n+1)!$ and $m > n-2$. Well, everybody agrees with $m > n-2$, but four other people sent in solutions and none of them agrees with the text or any of the others! Rather than throw my two cents' worth into that rapidly increasing pot, I shall leave the issue as it stands. As a final comment, my roommate Steven M. Slutsky, '68, obtained the same answer as Mr. Mohan in about half a minute but then noticed he had confused the red and blue books. As of press time no further pearls of wisdom have poured forth.

73—Show that if $2^p - 1$ is a prime then $2^{p-1}(2^p - 1)$ is perfect.

Doug Hoylman gave a neat solution: Since $2^p - 1$ is prime, $2^{p-1}(2^p - 1)$ is already decomposed into prime factors. Hence the divisors of this number other than itself are $1, 2, 4, \dots, 2^{p-1}, 2^p - 1, 2(2^p - 1), \dots, 2^{p-2}(2^p - 1)$ and the sum of these is

$$\sum_{n=0}^{p-1} 2^n + \sum_{n=0}^{p-2} 2^n(2^p - 1) \\ = 2^p - 1 + (2^{p-1} - 1)(2^p - 1) \\ = 2^{p-1}(2^p - 1)$$

Hence the number is perfect. (This suggests a related problem: If $2^p - 1$ (or, in general, $m^p - 1$) is prime, show that p is prime.)

Also solved by Mr. Rosenthal.

Better Late Than Never

Eric Rosenthal has sent in solutions for #63 and #68, and Capt. Roger A. Whitman, '61, solved #63.

Letters on Review

Considerable Credit

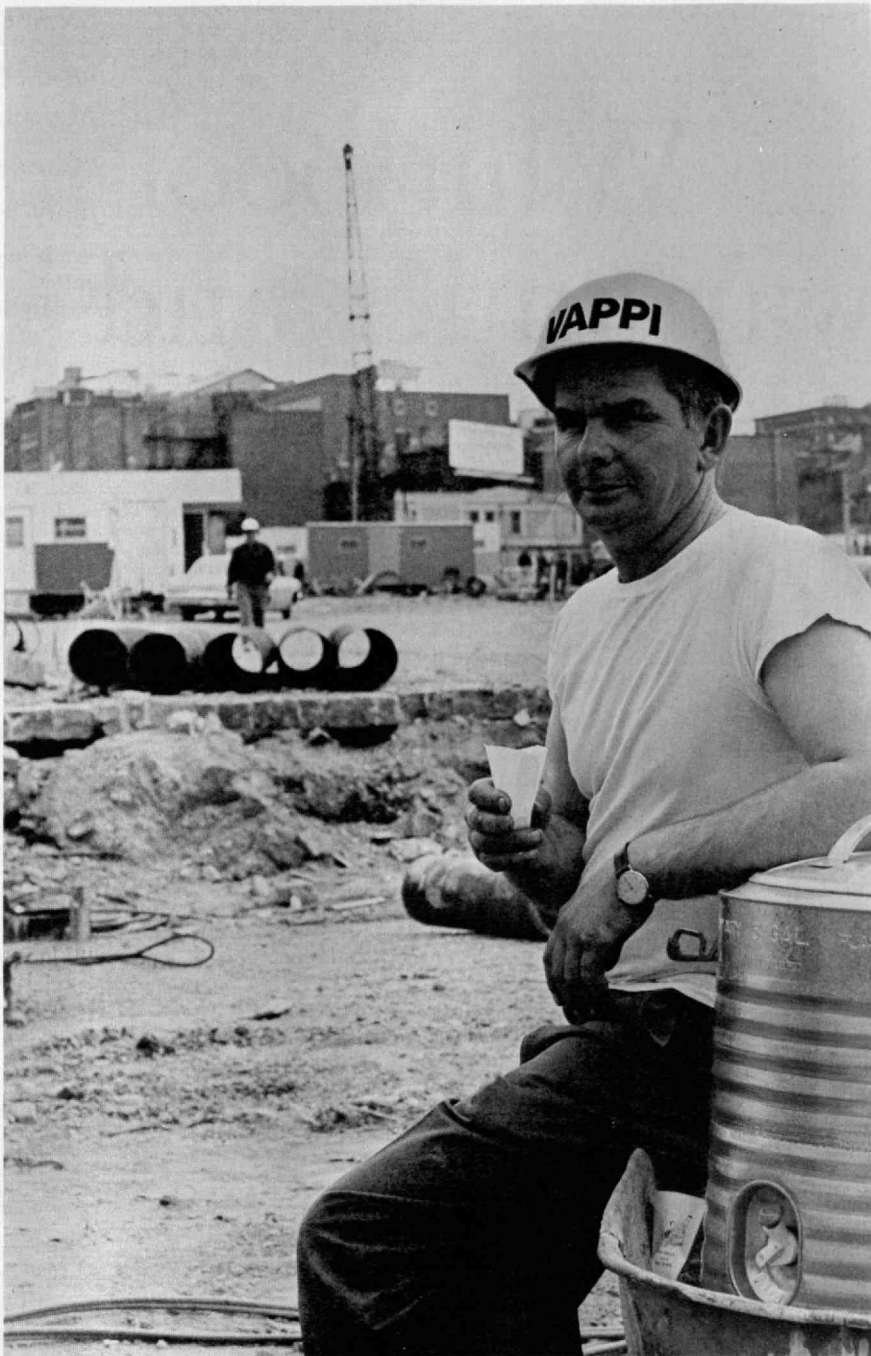
To the Editor:

I have just seen the April issue of the Technology Review. The special supplement which was included dealing with the many problems of the Federal government is extremely informative and of considerable interest to many of us in other universities in the United States.

I do see Technology Review from time to time and regard it as an outstanding publication which brings considerable credit to the Massachusetts Institute of Technology.

F. N. ANDREWS

Vice-president for Research and Dean
Purdue University.
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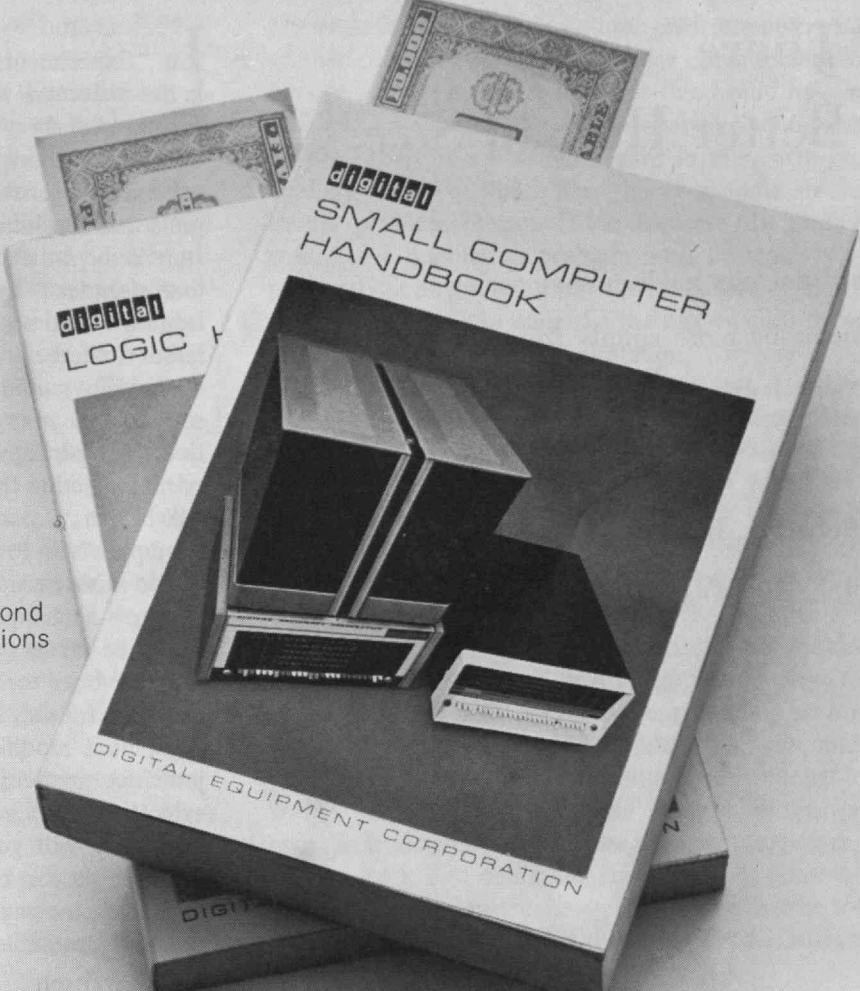


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Is There A Better Human Size?

Would not our modern engineering
problems be more simply solved
for "small man" than for "pre-small man"?

By Robert J. Hansen, '48, and
Myle J. Holley, Jr., '39

In "Experimental Genetics and Human Evolution," in the *Bulletin of the Atomic Scientists* (October, 1966), Joshua Lederberg discussed the prospects for controlled human evolution. While this may occur through either eugenics or genetic alchemy, Professor Lederberg suggests that the latter may provide the more rapid route. Indeed, he indicates "a time scale of a few years rather than decades." Even allowing for the fact that his colleagues would not all agree with this judgment (as Professor Lederberg acknowledges), the general scientific community would appear well advised to consider most seriously the many implications. Failing such consideration (and perhaps even given such forethought) "precedents affecting the long-term rationale of social policy will be set . . . on the accidents of the first advertised examples," as Professor Lederberg has concluded.

We wish here to comment on one kind of human change—a change of physical size—which apparently would be far less difficult to achieve than the modifications we infer to be potentially feasible through genetic alchemy. Indeed, it is our understanding that controlled, substantial modification of size may require only the judicious application of findings in the area of endocrinology. Any serious proposal in this direction undoubtedly will generate widespread antagonism. Yet, given Professor Lederberg's judgment that even more profound changes in the human species will be feasible in the foreseeable future, can we afford *not* to con-



sider, in all its aspects, the question of human size?

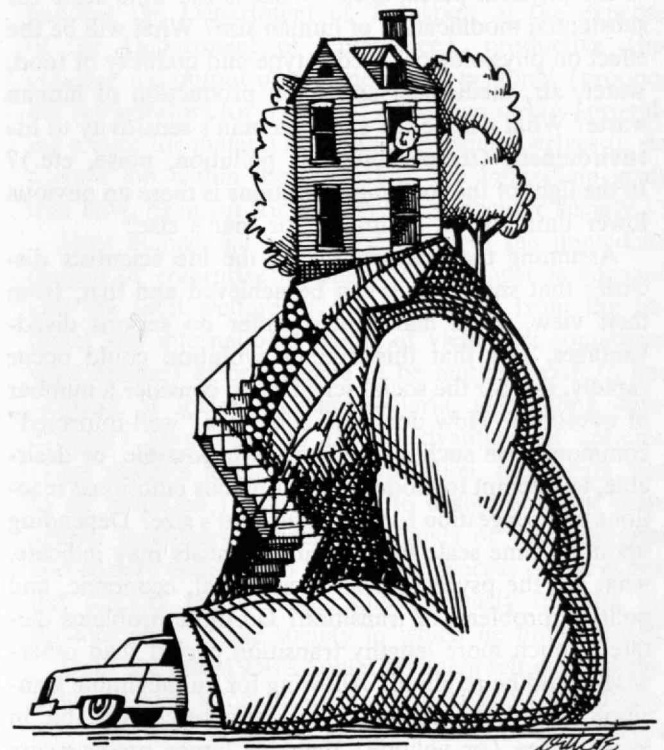
To Decrease Man Is To Increase His Environment

If, as the authors believe, the question of human size merits thought, it appears more reasonable to consider a decrease rather than an increase in size. First, an increase in size would clearly aggravate the problems we already associate with our excessive rate of population growth. Second, the advantages of large size and physical strength (in the performance of useful labor, the resolution of individual and group conflicts, etc.) have been almost entirely eliminated by technology. Third, as D'Arcy Thompson and others have shown, the strength of materials of the human body would require improvement to accommodate any substantial increase in the size of the human mechanism; incidentally, this same factor, quality of materials, limits the size of many of the structures which man builds to serve his needs. Fourth, society is not comprised of humans of a single size, but rather an adult set and a still-growing set of children. Any discussion of the human size focuses on the size of the adult set; the other may provide valuable insights into the implications of size decreases.

Superficially, a reduction in man's size might be compared to an increase in the size of the earth, all its features, and other living organisms. While such a concept may be helpful, it has serious limitations. It neglects the question of the relative sizes of man-made and natural features of our physical environment. More important,

a change in scale of our natural environment, whether gradual or rapid, would have similar impact on all members of society; a change in man's size would have quite different impacts on those who change and those who do not. There is a possible hazard in this earth-growth analogy—namely, that it may signify to some an answer to the problem of population increase. In reality, of course, the population problem must be resolved independently of any possible change in the size of man; and any possible merit in altered size must be considered on the basis of the present population, (or any assumed population level). This is not to say that questions of size and number are mutually exclusive. Hardly! Rather, the question of number is imperative and must be resolved without delay motivated by any hopefully imagined relief through size control.

The authors are intrigued by the probable impact of a reduction in human size on the engineering needs which are the particular concern of civil engineers. This is not to say that other areas of impact do not require far more consideration. Rather it is simply reflective of the fact that we are involved in civil engineering, an area of technology tightly coupled to human behavior and human needs. In order to satisfy these needs we must build, within the next few decades, new buildings, power sources, transportation facilities (for people, power, materials, etc.), and communication nets, all considerably in excess of presently existing totals. This is true for the relatively advanced regions of the world; it is even more



true for the less-privileged regions. What is built and the degree to which it serves the intended purpose can be very greatly influenced by any substantial change in the size of man. Consider, as but one example, the relation of man's size to the facilities provided for his transportation. Smaller man could mean smaller vehicles, either smaller highway rights of way or greater capacity for existing highways, easier provision for off-street parking, and so on. Similar benefits of smaller human size become apparent in buildings where, for example, the number of floors per unit height and the *apparent* clear spans would be increased.

The impact in regard to natural resources of a change in human size is not completely clear, although the per capita consumption of some resources (e.g., food) obviously would be reduced. Quite possibly per capita energy consumption would be increased, through the desirability and possibility of substantially increased power assists to man.

Suffice to say that, given our present technology and its immediately foreseeable extension, the "engineered" needs of society might be more successfully provided for "small man" than for "pre-small man."

What Price Man's Shrinkage?

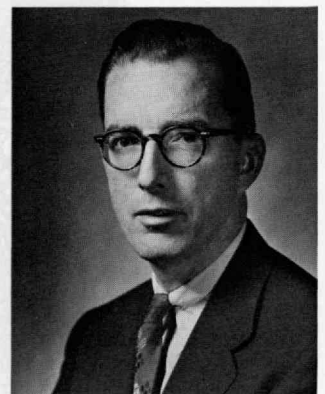
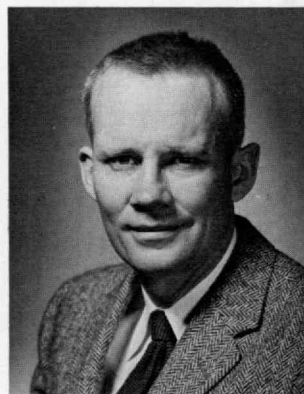
It is, of course, far more essential to judge whether these potential benefits can be achieved at a price, in terms of social impacts, which is acceptable. In weighing this price one must bear in mind not just the ultimate state but, more particularly, the problems of transition. A pattern of inquiry and debate, partially intra-disciplinary and partially inter-disciplinary, will be required. For those in the life sciences there are obvious questions: Can the size of man be substantially reduced without impairment of his mental and physical health and without impairment of his intellectual capabilities or his physical perceptions? What is the time scale for substantial modification of human size? What will be the effect on physiological needs (type and quantity of food, water, air, medicines) and upon production of human waste? What will be the effect on man's sensitivity to his environment (temperature, air pollution, noise, etc.)? In the light of the foregoing questions is there an obvious lower limit, or an optimum, for man's size?

Assuming that inquiry among the life scientists discloses that smaller size can be achieved and that, from their view, small man would suffer no serious disadvantages, and that this human evolution could occur rapidly, it is for the social scientists to consider a number of questions: How does one achieve a "well-informed" community on such a question? Is it possible, or desirable, to attempt to moderate the obvious emotional reactions to a suggestion for changing man's size? Depending upon the time scale that the life scientists may indicate, what are the psychological, sociological, economic, and political problems of transition? Do these problems dictate a much more lengthy transition period than otherwise would be required? Allowing for an inevitable transition period, will smaller man really be comfortable in lesser space (or volume) than his larger predecessors

have come to expect? Can anything be said regarding the probable *humanity* of a society of small men? If a change in size appears to be desirable, what incentives, if any, will lead to its achievement through free, individual choice? Is it at all proper to consider deliberate creation of such incentives in view of man as a free-thinking entity? Has government any proper role in its implementation?

For the physical scientists, the engineers, and the economists, there also are questions—in some ways less difficult. It is for them to study the impact on man's needs, the demands on natural resources, the relationships between the time scale of size change and the time scale of technological evolution per se. The matter of time scale is of paramount importance. If, for example, the life scientists or social scientists should conclude that some mean of adult size must not be permitted to decrease more rapidly than, say, 5 per cent per decade, the impact on the planning and execution of engineering works would be almost imperceptible. If, on the other hand, a rapid change appeared both possible and desirable (e.g., 25 per cent per decade) the impact on planning for future engineering works would be profound.

It must be emphasized that the authors are not advocating an alteration in human size. Within their limited area of competence, however, they sense that, good or bad, the effects might be substantial. Needless to say effective consideration of this question will require not only effort within the scientific and humanistic communities, but frank and sympathetic interactions between the two. The end product of such inquiry and debate is not predictable. Possible conclusions range from feasibility, desirability, and moral acceptability to impossibility for technical, social, or other reasons. But need we prejudge the issue? Or should we seriously study the question? ■



Robert J. Hansen, '48 (left), and Myle J. Holley, '39, both joined the M.I.T. Faculty in Civil Engineering in 1947, and both have remained at the Institute ever since. Professor Hansen, whose undergraduate degree is from the University of Washington, has recently devoted much of his time to teaching and research on various problems concerning high-speed ground transportation; he is deputy director of M.I.T.'s Project Transport. Professor Holley joined an engineering firm soon after graduation from M.I.T., returned for his master's degree (1947), and then joined the Faculty to teach structural engineering.

What Makes the Soviet Manager Run?

Such Western concepts as profits,
interest, rent, and managerial autonomy
are now entering the Russian vocabulary

By Marshall I. Goldman

Many readers of *The New York Times* in January, 1967, were stunned to see a double-page advertisement of the Soviet government: "Now you can draw attention to your products . . . by turning to advertising. Soviet specialists and managers will not fail to take notice of your advertisement when leafing through their morning newspapers or reading their trade magazines, listening to the radio or watching television. In short, they will do exactly what their opposite numbers in other countries do."

Even though commercial life in the U.S.S.R. is not yet as idyllic as this advertisement implies, Soviet executives are beginning to pay more attention to Western products and techniques. Their new attitude toward advertising is one of the more spectacular aspects of the reoriented Soviet economy. While such changes are a product of many factors, the most important innovations are often referred to as the Liberman Reforms, after Evsei Liberman, a professor of economic engineering at Kharkov University. His ideas and articles have sparked the Soviet's move away from central planning, toward more emphasis on profits, interest, rent, and managerial autonomy.

The introduction of such reforms has necessitated some very basic adjustments and has been accompanied by far-reaching debate and economic reorganization. One of the most intriguing consequences, however, has been the impact of reform on the Soviet manager.

What Motivates the Managerial Species?

Like a decision-maker anywhere else in the world, the Soviet manager is primarily concerned about performing well according to the criteria which confront him. Whether the ultimate ends are antisocial (designing a more effective form of biological warfare), narrow (expanding the Department of Transport at the expense of the Department of Commerce), productive (increasing the output of automobiles), personal (producing refrigerators for a profit), or humanitarian (providing a cure for malaria), a manager usually strives to do a good job within the context of the immediate goals that have been set for him by his particular society.

Most managerial goals promote both the immediate project or enterprise in which the manager is engaged and the total welfare of society viewed from the national and international points of view. Yet sometimes what appears at first glance to be humanitarian to one segment of society (curing malaria, assembling automobiles) may work to the disadvantage of another. (Less malaria leads to overpopulation, more cars lead to air pollution.) The trick is to design a set of managerial incentives whereby the goals of the enterprise and society coincide so that in the process of his everyday activity the manager simultaneously furthers the broader ends of the society in which he finds himself.

Until the mid-1950's Soviet planners felt assured that they had such a fortuitous marriage of goals. Gradually, however, they began to realize that there had been a

change in conditions, that somehow Soviet managers at almost all levels were no longer promoting the national good. Even though the manager at the plant level was doing his job as well as before and responding to the traditional stimuli, the quality and variety of the goods being produced were not what they should have been. Unexpectedly inventories began to pile up and the rate of economic growth began to slow down. Yet most Soviet managers were not being deliberately disruptive. It was like trying to cool a hot room when the thermostat is placed near the window: the more the window is opened, the hotter the room becomes. The Soviet manager, like the thermostat, was doing as instructed, but what he was doing was wrong in the broader context of the nation's welfare. In fact, as we shall see, the better the manager performed according to the existing success criteria which had been designed for him at the plant level, the worse the national situation became and the higher the stock of useless goods rose. The remedy for such a malaise lay in revamping the whole incentive and planning system, and as we shall see this was the essential effort and accomplishment of Liberman and his supporters. They have now designed a new system of goals which they hope will once again channel managerial efforts in the same direction as the general good.

The Old System

One of the most pressing issues confronting the new Bolshevik government when it came to power after World War I was how to industrialize the country. It was not that Russia was an industrial wasteland; there had been an impressive spurt of industrial activity. But Russia was industrially inferior to the other large European powers, and for both nationalistic and ideological reasons the Bolsheviks concluded they had to industrialize as rapidly as possible.

Traditionally private owners of factories in Western industrialized countries had not concerned themselves particularly about their country's economic growth. Normally a manager could accomplish his own ends best by selling more of his product and increasing his production. As an incidental by-product, this increased the country's gross national product. Western managers' efforts to assure profit for themselves had brought about a fairly balanced, well-adjusted growth, and the system seemed to be self-correcting. Changes in taste and demand were rapidly transmitted by a "feedback" system to the factory manager who acted quickly to maximize his profit; overexpansion was immediately indicated by a fall in sales, a change in prices, formation of excess inventory and a fall in profit.

This rather precise but unco-ordinated control through prices and profits did not appeal to Soviet planners. They were more concerned about massive change than careful adjustment. The Russians were in a hurry, and they sought growth faster than at any previous time in history. They wanted to open the throttle wide. The slow and not-always-sure methods of industrialization of the West would simply not do. No country had ever

before World War II experienced economic growth of much more than 5 per cent a year. The economic miracles of rapid growth which took place after World War II in Europe and Japan without central planning were as yet unknown and unimagined.

So the Soviet leaders adopted a severe and draconic form of central planning to bring about the industrialization they were seeking. Pleas for moderation inevitably were equated with opposition to industrialization. They refused to believe that a poor country with tremendous productive opportunities should or could be intimidated by fear of overproduction. To them the whole phenomenon of overproduction was an inevitable consequence of the capitalistic system and the absence of central planning.

The Russians felt that modern and rapid industrial growth depended on mass production which in turn required major structural changes in the country's economic makeup, and they were unwilling to wait for these changes to evolve gradually. So they sought to force the changes and performance they desired by formulating and adopting a series of long-term plans. By specifying long-term goals for the country and each enterprise in it, Soviet authorities believed they could better co-ordinate and direct the country's resources toward those ends.

Yet it was realized that even with a centralized plan industrial production depended on more than just the issuance of directives and the dispatch of inspectors from Moscow. Somehow the individual factory managers had to be motivated to fulfill the targets of industrialization. What was the best way to direct the manager's efforts into the promotion of this all-important goal?

The traditional industrial motivation was profit, but Soviet planners concluded that reliance on profit as an incentive would not induce the fundamental structural changes in the time available. The concept of profit was never actually abolished, but its operational significance was drastically reduced. Instead, managers were to be judged by how well they fulfilled various quantitative targets. Successful fulfillment of the individual targets at the enterprise level would automatically assure successful attainment of the national plan, and this would solve the problem of insuring that activities at the enterprise level coincided with the national goal of speedy industrialization. (A slower rate of industrialization without trauma and disruption might have carried the country just as far if not farther, but it is hard to argue with success.)

This system of central planning and physical targets did achieve the basic purposes. Managers strained themselves to fulfill and overfulfill their targets in order to earn extra bonuses and recognition. With such a system of stimuli, managers did all they could to avoid plant shutdowns. They did not have to worry about finding a sales outlet for their product; all they cared about was finding a steady source of supplies and turning out production. "Down time" to reset equipment for model changes was avoided, for production quotas

could not be met with a production line shut down while the product was redesigned to better fit customer needs. Thus, for example, the length of the run in Soviet steel mills was determined more by physical than merchandising necessity. As Gardner Clark has shown, Soviet managers and engineers boosted output per blast furnace far above comparable levels in the United States. Such policy meant that Soviet managers often found it hard to obtain more than one basic size and shape of steel. For the same reason Soviet men found it hard to buy anything but one style and occasionally only one size of blue underwear. In this way Soviet managers continued to fulfill and overfulfill their quantitative targets. Recognition, promotion, and salary depended on target fulfillment, and Soviet managers responded as you and I might.

The Tide Changes

It was not until the mid-1950's that some of the more perceptive Soviet economists began to warn of a developing schism between this managerial incentive system and the desire for economic growth. By 1960, the shortcomings of the existing incentive system obviously began to counterbalance the advantages.

Some sectors of the economy were affected earlier than others. One of the first signs that conditions had changed was the easing of several of the shortages which had been endemic during the great push onward toward higher and higher production goals. For years, the successful manager was the one who was able to hoard large inventory stocks to assure himself of a steady flow of production supplies. But gradually, as supply channels began to fill, hoarding became involuntary instead of voluntary. After all, how many basic machine tools or sewing machines can be absorbed by even a growing economy? Moreover, because the emphasis had always been on quantity rather than quality, some industrial and domestic consumers simply refused to accept some of the equipment once their basic needs had been satisfied. Since there was virtually no innovation from within the factory itself, there was inadequate improvement of product quality and style. Consumers were slow to pay for a second product when it differed little, if at all, from the original one. So inventory stocks began to accumulate as factories continued to produce goods that no one wanted. Like the Sorcerer's Apprentice, there appeared to be no way to stop the flood. The incentive system called for the continued output of goods that could only be consigned to the warehouse. Excess inventories finally rose to more than \$4 billion. In addition to the reluctance of managers to innovate within the factory, state planners also showed a marked unwillingness to risk major innovation. It was simply too risky.

The Soviet incentive system, superbly capable of intensifying productive efforts on existing products and processes, could not cope with change. As Khrushchev put it, "the production of steel is like a well-traveled road with deep ruts; here even blind horses will not turn off because the wheels will break. Similarly some of-

*What good was it to have
the world's highest output per
blast furnace and virtually
no plastic, computer, or
fertilizer industries?*

ficials have put on steel blinkers; they do everything as they were taught in their day. A material appears which is superior to steel and is cheaper but they keep on shouting, 'Steel, steel,' " But what good was it, Khrushchev asked, to have the world's highest output per blast furnace and virtually no plastic, computer, or fertilizer industries?

What innovations had been generated were almost always the result of massive campaigns, apparently the only way the Soviet government could jolt its planners and managers. The best illustration of this was what happened in 1963 when Khrushchev suddenly realized that if he wanted better things for better living, he would have to find them through chemistry. But how do you build a chemical industry overnight? Khrushchev used all the power and propaganda of the state. He even tampered with some original and sacred gospels. Lenin's injunction that "Communism is the Soviet system plus the electrification of the entire country" was altered to read, "Communism is the Soviet system plus the electrification of the entire country, plus the chemicalization of agriculture." Capital expenditures of \$45 billion over a four-year period were promised. Nothing was considered to be new or modern unless it involved some association with chemistry. In 1964 I was shocked to find even Moscow's taxi drivers reading chemistry textbooks in their spare time. The campaign method had its obvious shortcomings, but the old incentive system made it virtually impossible to induce innovation and change in any other way.

There were other failings of the quantitative target system, too. It generated spurts and lags in even the normal production process. Everyone always waited until the last minute to fulfill his targets. Most factories produced 50 to 70 per cent of their output in the last 10 days of the month in order to insure their eligibility for monthly production bonuses. This became known as "storming." To avoid ulcers and reduce last-minute pressures, most managers consistently understated their productive capacities in the hope that their planned targets would not be set too high. This meant that success was just as dependent on the bargaining skill of the

manager as on his plant's manufacturing ability.

Another by-product of the system of planned targets was that each manager tried to become self-sufficient. It was bad enough when there were production problems within his factory; for that the manager was prepared to lose his bonus. But it was intolerable when a manager found that he could not fulfill his quota because his suppliers had failed to live up to their previous commitments. To avoid such situations, most managers tried to make themselves self-sufficient, as independent as possible of others for their supplies. Subcontracting was held to a minimum. The result was duplication of facilities and a form of domestic autarchy which eliminated many of the economic advantages which come with the division of labor.

While many of these difficulties were due to the growing irrationality of the incentive system, some of them were also due to the unique arrangement of allocating capital. Because Marx felt that interest was simply a tool of the capitalist system, the Russians refused to permit any capital charge. In effect, this made capital a free good. But there was only so much to go around, and it had to be allocated by administrative fiat, which did not always bring about a maximization of economic usefulness. This led to overcapitalization in some sectors of the economy and shortages of capital in others. For those managers with the right connections, there was virtually no limit to the amount of capital they might accumulate. Inevitably the productivity of new capital projects was not always as high as it might have been. Furthermore, because capital was free, managers were under no particular pressure to complete construction projects and put their capital to work, and they paid little attention to capital repair and maintenance. One study showed that whereas almost 80 per cent of the equipment produced and installed in Moscow machine tool factories was up to world standards in terms of technical proficiency, only 40 per cent of the equipment was up to world standards in terms of durability. Because capital was a free good, there was little need for the manager of most important enterprises to be concerned about repair and maintenance which after all did

cost a certain amount of money.

It is important to stress that most of these inadequacies were not due to any sudden malevolence on the part of the managers. The Soviet manager had been doing exactly the same thing since the 1920's. He was simply doing what came naturally and following the rules which had been set up for him. For 30 years the system achieved the rapid growth which the Soviets sought and its distortions and failures seemed a small price to pay. But by the early 1960's it was obvious to the Soviet government that some different incentive system was necessary to utilize the momentum of the manager to further the national good, to make it natural for him to strive for better quality and more innovation and show greater concern for customer demand.

The New System

It was against this background that the proposals of Professor Liberman suddenly took on such importance in the fall of 1962. Actually Liberman had advocated changes in incentive systems as early as 1948 and he and various other Soviet economists continued to make similar proposals in the mid-1950's. But such ideas were still premature. As long as the economy continued to grow and economic technology did not lag far behind, there was no reason to junk a production system which had stimulated the manager to serve his country so well.

But in the early 1960's, even the political leaders began to realize that all was not well. Not only were there serious problems in agriculture, but the rate of growth in industry also declined significantly. So it was that Liberman's famous article in *Pravda* in November, 1962, touched off an economic debate in the U.S.S.R. that was equal in its depth and seriousness to the original debate on industrialization in the 1920's. The result was that, after some initial experimentation, retraction and compromise, Kosygin in September, 1965, decided to introduce a new incentive system throughout all of Soviet industry.

The main feature of the new system was the decision to abandon quantitative targets. Now that the industrial base had been constructed there was no longer any need of growth for growth's sake. What was needed, was an inducement for managers to become more sophisticated and responsive to changes in customers' needs. As Liberman argued, the manager was more likely to improve his flexibility if his incentives were dependent on profits earned rather than on output produced. The profits would still accrue primarily to the state, but because it was a more encompassing measure of activity, profit maximization would cause the manager to consider several variables—rather than production alone—in determining his course of action. For the first time the manager would have to worry about obtaining customer orders; he would have to anticipate and produce what was wanted by the consumer rather than the planner in Moscow. The benefit to the customer (both industrial and individual) should more closely parallel the benefit to the national interest.

Liberman and Kosygin were realistic enough to

*The problem: to make the
manager of a Minsk automobile
works respond in the same way
as the manager of a
General Motors assembly plant.*

realize that a sudden reliance on profits alone might lead to a serious disruption of economic activity. After years of forced effort, major disproportions had been built into the economy. There was justifiable fear that Soviet managers would discover that enormous profits could be made by a radical reorientation of productive effort. Inevitably this would lead to a serious misallocation of resources.

Most of the checks and balances typically associated with the profit system had atrophied or been prohibited. There was no charge for capital, and there was no effective rent charge. Capital and land were treated as a free good. If profits were the sole criterion of action in such a situation, managers would overindulge themselves in grabbing capital and land. Furthermore, there had been no basic price adjustment for more than 10 years, while relative cost and demand conditions had changed significantly. Unless prices were adjusted to take these altered relationships into consideration, managers would only produce goods on which prices were unduly high. It was a matter of top priority, therefore, to introduce price reform and charges for capital and land. Although these have now been accomplished, observers of the Soviet scene as well as Soviet authorities themselves have expressed considerable doubt that such changes can be successfully implemented without a prolonged series of subsequent readjustments. Since prices and costs are interrelated, it is hard to know what the price of steel should be until it is known what the price of coal is; but in turn you must know the price of steel to set the price of coal. All of this suggests how complicated such a reform can be.

As additional insurance that adoption of the profit system would not cause too much havoc, some other success indicators have been imposed on managers—at least temporarily. Many enterprises have been assigned a sales target: the size of the bonuses of the employees and manager has been made partially dependent on the actual purchase of and payment for the factory's products. By insisting that the sales plan should include the sale of various priority goods, planners are trying to insure that managers will not ignore certain important needs of the state by insisting that sales plans include quantities of high-priority goods. Bonuses have also been made to depend on something called profitability, or the rate of return. This is the familiar ratio of profits to working or fixed capital, and its use forces managers to economize on the use of capital, something that was not done in the old system.

In its complete form, the reform is considerably more complicated, but enough of it has been presented here for the reader to sense the sweep of the proposals. Already there have been indications of new and radical results. Now that the concept of interest has been salvaged from the scrap pile of history, Soviet financial authorities have gone on to argue that interest payments should be used in other cases where there is also a flagrant waste of the country's capital. Toward this end, one authority wants bankers to pay interest on enterprise bank deposits. He argues that this will induce

managers to hold back on their investment projects until they have accumulated enough purchasing power to complete the entire project. This should reduce the tendency of Soviet managers to fill the countryside with half-completed projects. But it will also mean that Soviet banks will pay interest on demand deposits, something that even American banks are prohibited from doing.

Equally radical in its implications is the proposal to set up labor exchanges and pay unemployment compensation. Heretofore the Russians have officially denied the existence of unemployment in the U.S.S.R. But this has created awkward situations, because there are in fact numerous job vacancies in certain categories. Since supposedly there is no unemployment, there is no unemployment compensation or any system to resettle unemployed workers. Because they fear such workers will be unable to find suitable work elsewhere or because the manager is often made responsible for finding the replacement job for them, the manager sometimes hesitates to rid himself of superfluous staff. With labor exchanges and unemployment compensation, it is hoped that managers will not hesitate to dismiss workers to increase profits and operating efficiency. The increased efficiency, they argue, will be worth the ideological embarrassment which will come from admitting the existence of unemployment.

The move toward increased independence for the plant managers could also lead to increased freedom for enterprises involved in foreign trade. This has already happened in Hungary, East Germany, and Poland. To promote more profitable foreign trade, Hungarian firms are authorized to deal directly with their foreign counterparts without bothering to check with the Hungarian Ministry of Foreign Trade. Presumably the Russians will soon permit the same thing. The realization that increased reliance on foreign markets can promote economic efficiency and growth is also reflected in the Russians' new willingness to turn their backs on some of their autarchic attitudes. Not only are the Russians ready and willing to buy more overseas but apparently they are willing to make direct investment in capitalist countries. They have already joined with local citizens to form joint stock companies for the sale and service of automobiles in Finland, for the operation of a department store in Belgium and for the conduct of an international trade firm in Morocco. While the size of the investment thus far is still very modest, the Russians no doubt find themselves reflecting on the recent advice of a Yugoslav government official. He, too, advocated direct investment overseas as a method of reducing balance-of-payment difficulties. With some indignation, however, he cautioned that Yugoslav officials should take care to see that the country they invest in does not follow a policy of nationalization!

As some critics have begun to sense, there is a real danger that the reform may go too far. Some economists worry that Soviet managers will come to shun unprofitable projects which may nonetheless be valuable to the national interest. For example, Soviet showpieces—

their subway system, their giant dams and their massive housing programs—may be abandoned without substantial government support.

The realization that there may be a danger in telling the manager that profit maximization will always coincide with maximizing the national welfare may help to explain a slight change in attitude among those advocating reform. During the initial debate in November, 1962, Liberman argued that "what is good for the firm must be good for the U.S.S.R." (*To chto vygoduc predpriiatiiu, dolzhno byt' vygodno i obshchestvu v tselom.*) Undoubtedly reflecting his concern as well as his embarrassment because he had gone even farther than Charlie Wilson, Liberman altered his statement in November, 1965, to "what is good for society must be good for each firm and for its workers." (*To chto vygodno obshchestvu, golzhno stat' vygodnym kazhdomy predpriiatiiu, kazhdomy ego rabotniku.*)

New Answers—New Problems

Will the new reform solve the new problems? While it is unlikely to cure everything, certainly it should lead to the correction of some abuses. The fact remains that there are still many pitfalls ahead in the operation of the Soviet economy. Because Soviet managers have been conditioned to respond in just the opposite way for almost 50 years, a whole new way of thinking and responding is now required. Heretofore, there has been no such thing as a Harvard Business School or a Sloan School and a field of study like business administration. Interestingly enough, the Russians are now beginning to show open interest in such institutions and concepts. There has even been some talk of a faculty exchange with both of these schools, and the Russians now have a student who is attending classes at the Harvard Business School.

Yet even if the Russians are able to train their managers and induce them through profits to respond to customer demand, there will still be problems. For instance, the initial gluts in the consumer sector consisted primarily of clothing and shoes, while there were serious shortages of certain foods. The Russians therefore decided to cut back on the production of clothing and shoes while improving their quality, and at the same time they managed to increase food production. To their amazement, the Russians discovered in 1966 that they were suddenly short of adequate stocks of clothing and shoes while warehouses were stuffed with surplus stocks of certain foods. As long as supply and demand are subject to the whims of nature and human fickleness, it will be impossible to predict accurately what will happen to inventories and to the economy.

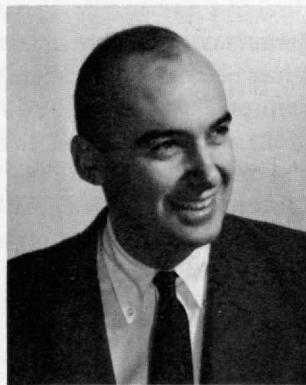
Nor will increasing computerization solve the Russians' problems. As American computer specialists will testify, the computer's analysis is only as good as its program and programmer. In fact, if the Soviet manager is not given full authority, there is a danger that he will use the computer as an excuse for shortcomings in his own decision-making ability. He may hesitate to question computer-produced predictions because he

knows that if anything goes wrong he can always blame the computer for the mistake. If he acts on his own, he will have to take the responsibility himself.

As anyone familiar with business will explain, the quest for profits is not all that is required for successful growth. Among other factors, there is the need for access to capital. The best idea in the world is no more than that unless a manager is able to acquire the resources to turn it into reality. Until now, almost all Soviet capital has been allocated centrally. Thus it has been difficult and sometimes impossible to win approval for new and sometimes risky ventures. The typical state banker feels safer providing funds for the expansion of existing processes than financing a brand new but only potentially brilliant venture. The new reform is designed to provide the manager with more control over his investment decision and allow him to spend some of his excess profits and depreciation allowance on new equipment without outside approval. With access to capital and a chance to share in the higher profits he earns, the Russians hope that their managers will find it easier and more desirable to innovate. Increased innovation and more attention to quality should lead to better fulfillment of the needs of the customer—and in turn of the country.

The Russian aim is to make Soviet managers of the Minsk automobile works respond in the same way as the manager of a General Motors assembly plant. This alone will not solve all the problems, but it will be an important step ahead. It will be interesting to see if the greater emphasis on profits will bring about a better merging of the interests of the state and manager. The Russians hope that this will be the case, but even if the end is achieved there is no certainty of its permanence.

The Liberman reforms remind me of the advice of a Boston business consultant. The first thing he does when analyzing the problems of a troubled corporation is to ask for the corporation's table of organization. If the firm is centralized he sends in his bill with the recommendation that the corporation decentralize. If the firm is decentralized, he sends in his bill with the recommendation that the firm centralize. Liberman has prescribed a strong dose of decentralization for an overly centralized system which found itself with an inappropriate and outdated system of goals. It would not be surprising if his successors some day find themselves prescribing at least a bit of the opposite medicine. ■

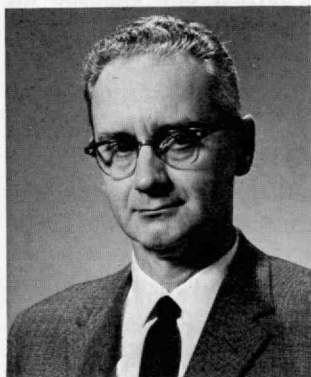


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The Riddle of the Moon— Solved in the '60's?

Even two years before men land on the Moon a detailed picture of our satellite is emerging from space probes and Earth-based observations

By John C. Noyes



John C. Noyes has been head of the Geo-Astrophysics Laboratory of Boeing Scientific Research Laboratories in Seattle since 1959. Prior to that, he was manager of the Boeing Company's Space Physics Branch. Dr. Noyes is also a member of the American Institute of Aeronautics and Astronautics Technical Committee on Space and Atmospheric Physics.

This decade will witness one of man's most technologically demanding exploits—his arrival on the Moon and his subsequent return with samples of lunar surface material. The astronauts' account by radio of their observations during the first few hours' exploration of a tiny area of the Moon, together with the results of the analysis of lunar samples after their return, will resolve at last many of the questions which have long been debated, such as the presence of lava flows or of dust, the origin of the surface features and the relative proportion of chemical elements. The manned landing will climax a decade of accelerated effort during which Earth-based observations, laboratory simulation, lunar probes and satellites have all contributed exciting new discoveries about Earth's companion in space.

The explosion of scientific knowledge regarding the Moon which has occurred in this decade was preceded by a gradual accumulation of knowledge and hypotheses dating from antiquity. The ancients recognized that the Moon is a sphere rotating on its axis in a time equal to its orbital period, and thus keeps approximately the same face toward the Earth; that the Moon's surface contains light and dark regions; that it lies about 60 terrestrial radii from the Earth; and that its own radius is about one-quarter that of the Earth's.

Shortly after the invention of the telescope in 1609 Galileo turned it on the Moon; from his observations he was "led to the opinion and conviction that the surface of the Moon is not smooth, uniform, and precisely spherical as a great number of philosophers believe it to be, but is uneven, rough, and full of cavities and prominences, being not unlike the face of the Earth, relieved by chains of mountains and deep valleys." Galileo's "cavities," now known as craters, have been a source of lively and often contentious discussion to this day, with early thought favoring an internal (volcanic) origin, and more recent investigators leaning toward the hypothesis that impacts of meteorites formed most of the features.

The absence of a lunar atmosphere had been deduced at an early date by the abrupt disappearance of stars during an occultation. The similar lack of water on the surface (despite earlier notions to the contrary—witness the word *maria*—seas—given to the large dark areas) implied a significant variation of surface temperature between lunar day and night. Infrared observations in 1927 by Edison Pettit and Seth B. Nicholson at Mount Wilson showed that the temperature varied from one extreme of approximately 400 degrees Kelvin at the point nearest the sun to 120 degrees K at the opposite point on the lunar globe; and that during a lunar eclipse the temperature at the nearest point dropped from about 400 degrees K to less than 200 degrees K during the course of an hour. From such a rapid variation in temperature they deduced that the surface must be a very good insulator, better, in fact, than most terrestrial insulators. Radio astronomical measurements added to the picture, showing that at a depth of a few tens of centimeters below the surface the temperature remains below the freezing point of water.

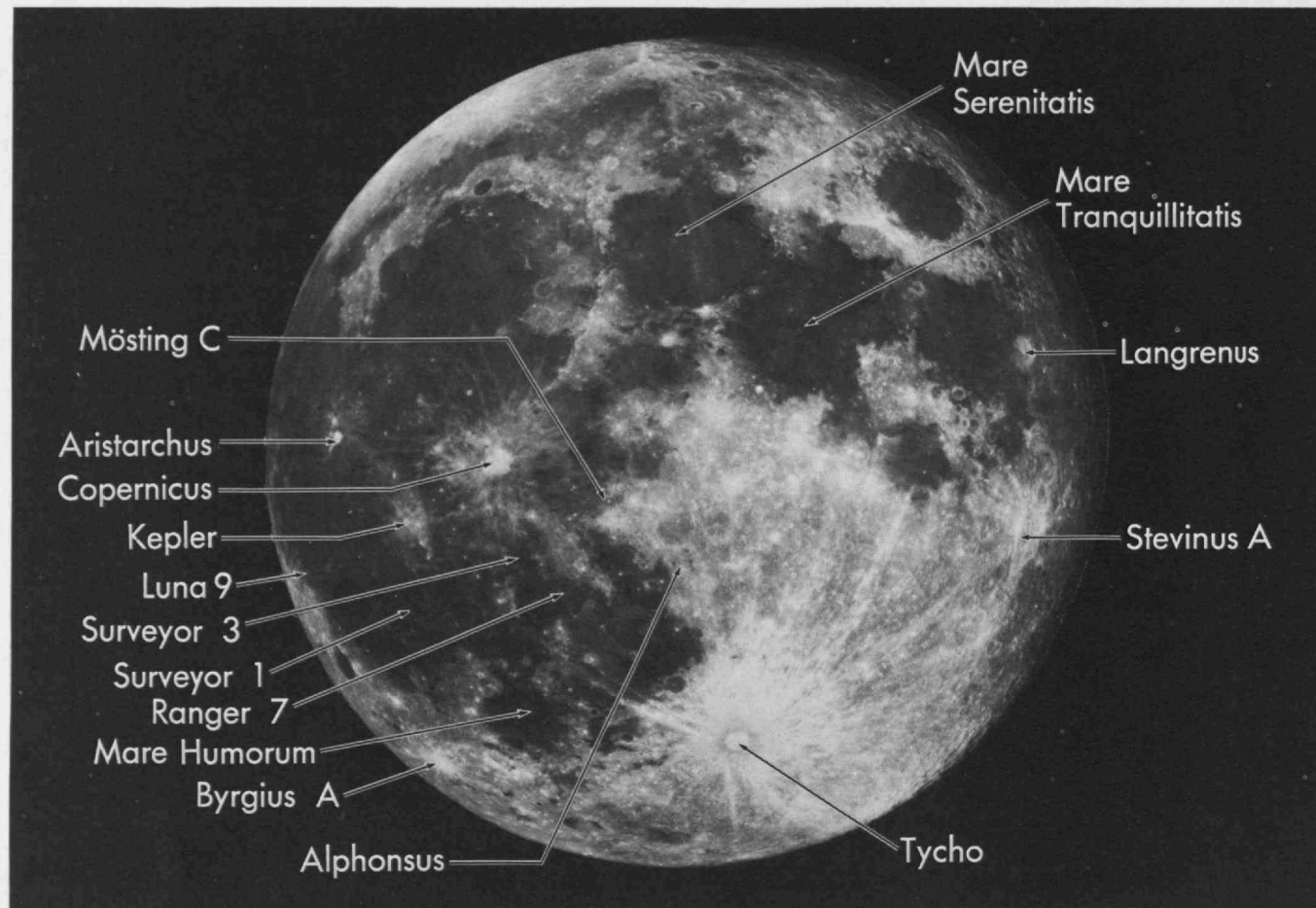


PHOTO: U.S. AIR FORCE

Full Moon, showing features mentioned in later illustrations or the text.

The indicated rayed craters, and probably the other bright craters as well, are among the youngest lunar formations. They are generally believed to have been produced by impact. The outline of the crater Alphonsus (not an impact crater) is washed out, but three dark regions on its floor can be seen.

In 1959 the Russians obtained the first lunar information based on spacecraft observations. One lunar probe, *Lunik 2*, revealed before crash landing that the lunar magnetic field was less than one-thousandth that of the Earth. *Lunik 3*, on circling the Moon, succeeded in taking pictures of the hitherto unseen far side. Although their resolution was far worse than that attainable by the atmosphere-limited telescopes on Earth (about one kilometer), these pictures nevertheless provided the basis for an historic first Atlas of the Moon's Far Side.

Thus at the close of the '50's astronomers had collected a significant amount of lunar knowledge. However, questions on such subjects as the origin of the craters and *maria*, the composition and mechanical properties of the surface, radioactivity, heat flux from within, and of course the origin of the Moon itself, remained topics of debate.

Hot Spots on the Moon

One of the first important new findings regarding the Moon in this decade was the discovery by Richard W. Shorthill and his colleagues at the Boeing Company that the Moon's thermal properties vary over its surface. Infrared observations in the region of the crater Tycho during the lunar eclipse of March, 1960, showed that the

crater cooled more slowly than its environs. At the end of the umbral phase the temperature difference had reached about 50 degrees K. An explanation that immediately came to mind was that the crater had a greater thermal conductivity than the surroundings. Alternatively, the thickness of the insulating surface layer may have been less. Both explanations are consistent with the fact that Tycho, an impact crater conspicuous at full Moon as the center of an extensive ray system, is relatively young—less than a billion years old, compared with more than four billion years for some of the lunar craters. The explosive release of energy when the colliding asteroid or comet crashed into the Moon disrupted the insulating blanket on the surface and exposed the rock below, while depositing debris to great distances from the crater. Insufficient time has elapsed for meteoritic erosion to return the surface to its original state. During the September, 1960, lunar eclipse, Shorthill and John M. Saari, of the Boeing Company, and also William M. Sinton of Lowell Observatory, confirmed this discovery of a thermal anomaly and extended it to several other rayed craters.

At the eclipse of December 19, 1964, Saari and Shorthill scanned the Moon with a very sensitive cooled germanium detector at the focus of a telescope. They

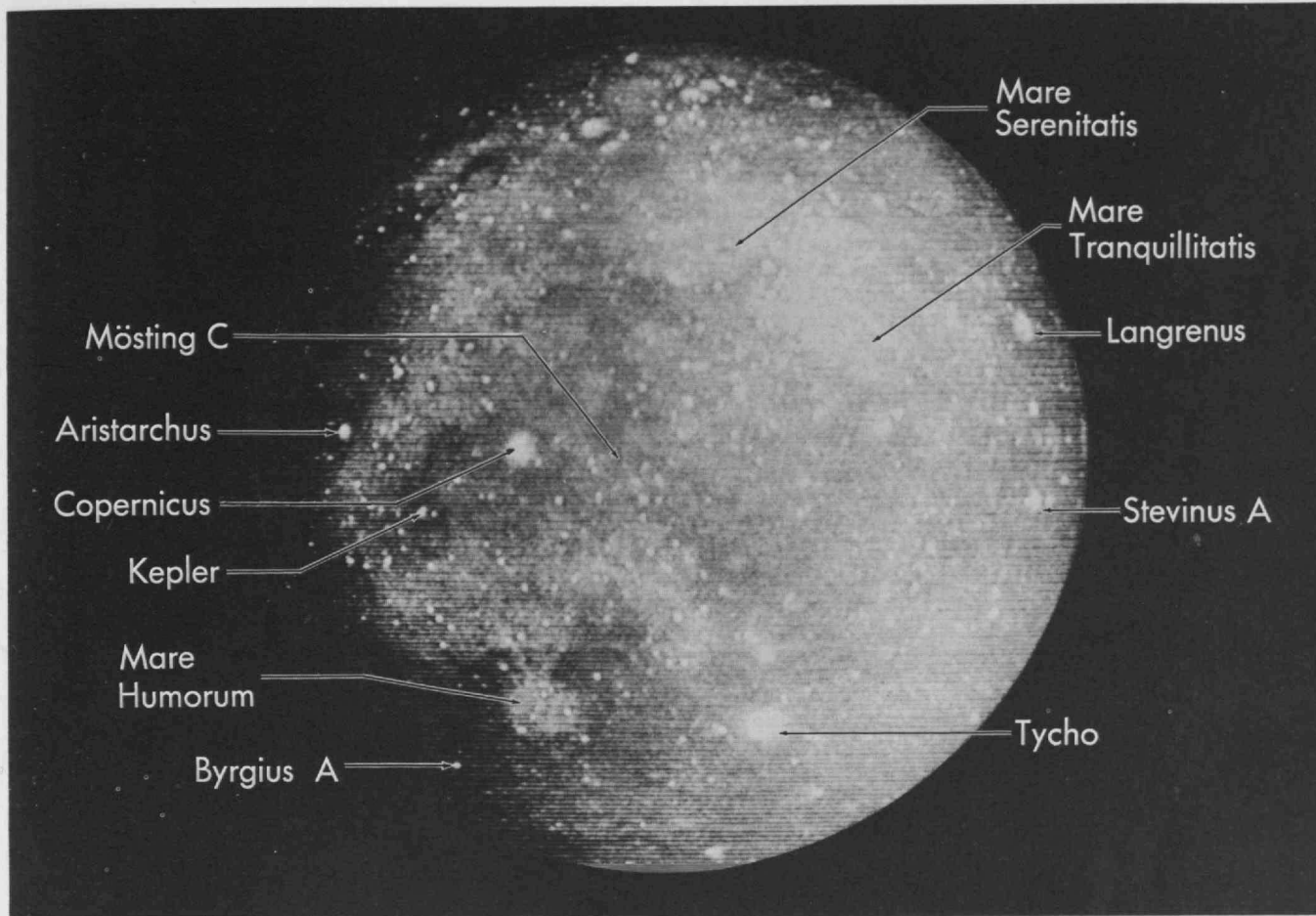


PHOTO: BOEING SCIENTIFIC RESEARCH LABORATORIES

Reconstructed infrared image of the totally eclipsed Moon on December 19, 1964. The degree of brightness of the spots and extended areas is proportional to their temperature. The most conspicuous "hot spot," the rayed crater Tycho, is at a temperature of about 225 degrees Kelvin, approximately 50

degrees K higher than its surroundings. The majority of the spots coincide with rayed craters or other craters which appear bright at full Moon. Several extended areas such as Mare Humorum, Mare Serenitatis and Mare Tranquillitatis are also somewhat elevated in temperature.

discovered many hundreds of "hot spots" whose temperatures ranged from a few degrees to over 50 degrees K more than their surroundings. Using similar instrumentation, Bruce C. Murray, '53, and Robert L. Wildey of Caltech were able to detect a few thermal features several days after lunar sunset. In general, the majority of these hot spots and dark-side thermal features have been identified with rayed craters or with other features which appear bright on the face of the full Moon. The structure of the lunar surface, rather than volcanic activity, serves to explain their behavior.

Observations by Radio and Radar

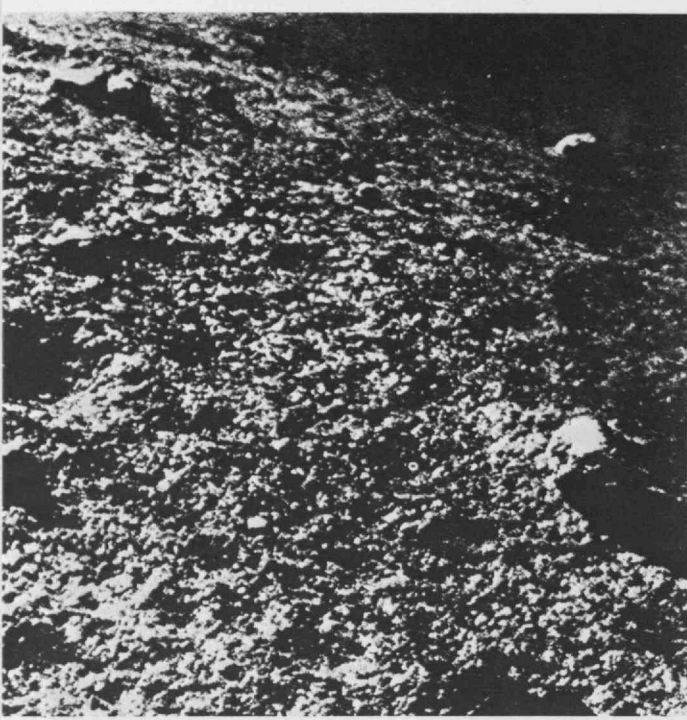
Astronomers have also measured the Moon's thermal radiation at radio wavelengths, both during eclipses and throughout lunar months. The thermal emission at the shortest wavelength observed, one millimeter, comes from the first few millimeters of the surface layer. At this wavelength the variation of temperature with the Moon's phase and during an eclipse resembles that at infrared wavelengths. As the observing wavelength is increased to values of centimeters, the emission comes from greater depths, and the (lunar) daily variation in temperature starts to decrease. At a wavelength of 10 to 20 centimeters, the emission shows no variation with

phase, implying that the temperature at a meter or so below the surface remains constant, at about 240° K.

These radiometric measurements indicate that the dielectric constant of the surface material to a depth of tens of centimeters probably lies in the range 1.5 to 1.8. Since the dielectric constants of typical surface materials, such as silicates, which we might reasonably expect to find on the Moon range from four to eight, we must conclude that the surface consists of loosely packed material, with low over-all density.

Additional information on the structure of the Moon's surface has come from radar studies. As distinct from the passive radiometric systems mentioned earlier, radar is an active system; pulses of a given duration and polarization are transmitted from Earth and the returned pulses analyzed with respect to strength, time delay, polarization and shift in frequency. Unfortunately, both radio and radar techniques suffer from poor angular resolution, since, with very few exceptions, the antenna beam-widths of the instruments are greater than the angular diameter of the Moon. Much of the radar study, therefore, has been of a statistical nature, and has led only to average properties of the scattering surface.

Radar studies at M.I.T.'s Lincoln Laboratory by John V. Evans and his colleagues have shown that at



One of the first close-up views of the lunar surface, obtained by the Soviet *Luna 9*. The spacecraft landed in a crater approximately 15 meters in diameter. The crater floor is rough on a centimeter scale; this is consistent with general surface conditions predicted from microwave radar results. Many small rocks and craterlets can be seen. The rock at the right center is about 12 centimeters in height, the craterlet at left center about 20 centimeters in diameter. A portion of the spacecraft can just be seen in the right foreground.

millimeter wavelengths the Moon is almost uniformly bright (as it is optically). This finding indicates that the roughness of the surface is also on the scale of millimeters. The average dielectric constant of about 2.7 which has been deduced is considered to be an average of the surface value of about 1.7, derived from radio emission data, and a value of 4-6, which is more representative of rocky material below the surface. Analysis of the scattering data indicates average slopes of 5 degrees to 15 degrees on a scale of meters.

By using the Doppler principle in conjunction with radar range information, radar astronomers have achieved resolution comparable with current infrared measurements. The frequency of the transmitted pulse alters because the Moon, as viewed by an Earth-based radar, appears to be rotating. Echoes from the approaching hemisphere will therefore return at a higher frequency than the transmitted pulse, while those from the receding one will have a lower frequency. The apparent rotation (not to be confused with the true rotation with period of about one month) stems partly from the Moon's motion in its elliptical orbit and partly from the radar's motion which results from the Earth's rotation.

These measurements of the frequency shift of a radar pulse define strips on the lunar disc parallel to the apparent rotation axis. Measurements of the time delay of the reflected signals supply the range information or distance of the Moon's surface from the point nearest Earth. Combining these two forms of measurements, in the so-called delay-Doppler technique, Gordon H.

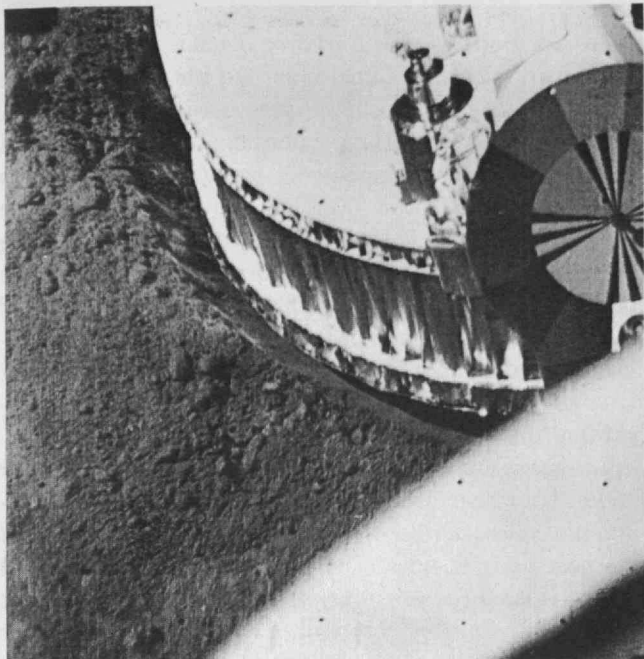
Pettengill, '48, and John C. Henry, '65, of M.I.T.'s Lincoln Laboratory found in 1962 that the crater Tycho produces anomalously strong echoes. That these were not due entirely to normal reflection was shown by the fact that the depolarized component was as strong as the polarized. Strongly polarized signals would result from normal reflection from a large amount of material perpendicular to the line of sight. A strong depolarized component, on the other hand, could result from an enhanced roughness of the surface, possibly produced by rocks, or from material with a high dielectric constant. The data were not sufficient to distinguish the relative contributions of these two possibilities. Recently Thomas H. Thompson, '48, and Rolf B. Dyce have extended the delay-Doppler technique to many other lunar features. Using the 300-meter reflector at Arecibo, Puerto Rico, they have found more than 20 craters which produce strong echoes. Many of these are also infrared anomalies, including the large rayed craters.

A fairly comprehensive picture of the lunar surface emerges when we combine the Earth-based results at all electromagnetic wavelengths—optical, infrared, radio and radar. The topmost layer is almost uniformly rough on a scale of millimeters or less and has low density to a depth of tens of centimeters to a few meters. On a scale of meters it is relatively smooth, with mean slopes of about 10 degrees. Certain features, particularly young rayed craters, are apparently rougher and of higher density. Both these characteristics are consistent with the presence of bare rocks, which can explain the infrared observations as well as the radar data. The lunar density under some meters of surface material probably compares with that of compacted terrestrial soil or rock.

The Moon in Close-up

Interesting and revealing as the radiometric and radar measurements are, they still represent average values over areas of at least 100 square kilometers, and in some cases the complete lunar disc. They simply cannot compare with close-range photographs in showing details of local regions on the lunar surface. The first spacecraft for this purpose, the *Ranger*, built by the Jet Propulsion Laboratory in Pasadena, was designed to relay television pictures from several cameras before striking the surface. The first photographically successful vehicle of this series, *Ranger 7*, crashed into the Moon on July 31, 1964, after transmitting some 4,300 television pictures of the surface, the last from a distance of only 440 meters. The highest resolution provided by these pictures, about half a meter, is approximately 2,000 times better than that obtainable from the Earth under the best seeing conditions. Early in 1965 two additional impacters, *Rangers 8* and *9*, returned almost 13,000 additional pictures, the former of a *mare*, the latter of the crater Alphonsus, where the Soviet astronomer N. A. Kozyrev had obtained spectra of an apparent gaseous discharge.

The photographs show two kinds of craters: primary and secondary. Primary craters have well-defined forms, relatively steep slopes and (usually) raised rims; presumably they were formed by the explosion of meteorites



Photograph of surface near one of *Surveyor 1*'s landing feet, which are about 30 centimeters in diameter. The feet compressed the surface to a depth of from three to eight centimeters and ejected some surface material. Some of this ejecta can be seen in the form of clods. Such *Surveyor 1* photographs dispelled the notion that the surface consisted of loose, powdery dust.

crashing into the Moon at high speeds. The secondary craters have gentle slopes, are shallower and are often rimless. These are thought to derive in part from the impact of low-velocity material spewed out from the primaries. Some of the secondaries lie in or along conspicuous linear surface structures, such as rifts or rilles, and it is probable that these craters are caused by subsidence: the surface material has drained into subsurface voids. Proponents of lunar volcanism point out that the presence of such voids and of linear structures such as faults and cracks is a natural consequence of energy release beneath the surface.

Counts of craters in the *Ranger* photographs as a function of diameter indicate an equilibrium distribution among sizes ranging from one to about 300 meters diameter. As new craters are formed by meteorite impact the material ejected from the surface by these impacts covers and eventually obliterates older craters with a blanket of rubble; hence, the total number of such craters does not increase in time. Confirmation of this process of creation and destruction of craters has come from simulations by Donald E. Gault and his collaborators at NASA's Ames Research Center, who fired particles at high speeds into evacuated powders and simulated soils. Comparison of their results with the *Ranger* photographs shows that a layer of fragmented, weakly cohesive debris probably covers the lunar surface completely, to a depth of at least several meters. Whether the underlying material is rock or (in the *maria*) lava remains open to speculation.



PHOTOS: JET PROPULSION LABORATORY

Trench dug by *Surveyor 3*'s soil sampler. The trench is five centimeters wide and 15 centimeters deep. Marks caused by screws in the blade of the scoop can be seen at the end of the trench. An object thought to be a rock can also be seen in the trench. Since the trench walls are vertical and have not collapsed, the lunar soil is clearly cohesive.

Two questions vitally important to the Apollo program could not be completely answered by the *Ranger* photographs: Would an astronaut sink to his waist, or deeper, as he stepped out of his landing vehicle? And, for that matter, would the retrorockets of the lander blast a hole in the surface in which the craft would be buried? These questions have been troublesome since 1955, when Thomas Gold, now at Cornell, suggested that dust eroded from surrounding mountainous areas filled the *maria*. Popular opinion has attributed crumbly, powdery qualities to this hypothesized dust, even though we know that in the absence of an atmosphere the particles will stick to each other, weakly at least—an example of vacuum adhesion.

The popular notion was proved to be fiction in February, 1966, when the Russian *Luna 9* soft-landed without penetrating the surface significantly. In June of the same year, the American *Surveyor 1*, built by the Hughes Aircraft Company, confirmed this finding. *Surveyor 1*, landing a mass of 292 kilograms at 3.6 meters per second, compressed the surface under its landing feet only to a depth of three to eight centimeters. From this it has been deduced that the surface should provide no impediment to walking astronauts.

The main mission of both these landers was to examine the lunar surface and surroundings at close range. *Luna 9*'s television system transmitted pictures showing surface details resolved on a scale of centimeters—about a factor of 50 better than the best *Ranger* pictures. The pictures showed that the surface was rough and pitted

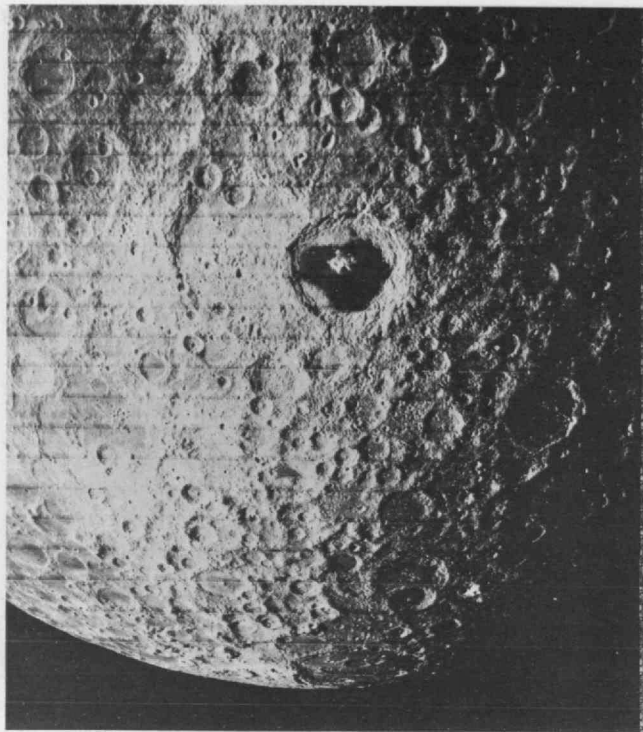


PHOTO: NASA

Far-side photograph taken by *Orbiter 3* in March, 1967, from an altitude of 1460 kilometers. The top of the picture spans approximately 1100 kilometers near the equator. The curved southern horizon reaches to within about 650 kilometers of the south pole. The crater Tsiolkovsky (center), discovered by *Lunik 3* in 1959, is prominent in a surrounding of rugged terrain. The crater's floor resembles the *maria* on the near side. From its low crater density the surface is apparently of more recent formation than the surrounding region. *Mare*-like regions are much less extensive on the far side than on the near side.

on this scale, as had been predicted from Earth-based measurements of its brightness. *Surveyor 1* took over 11,000 pictures in two lunar days, during which time the varying lighting conditions and shadow lengths caused by the sun's changing angle of elevation permitted detailed examination of the surface. Its appearance from the *Surveyor 1* pictures is not unlike that of wet, sandy soil consisting of grains less than half a millimeter in diameter. (The wet-soil analogy should not be carried further, since no water can exist at the surface owing to the high daytime temperature. However, some authorities, notably Zdenek Kopal at Manchester University, and Gold, have postulated the existence of permafrost at depths of tens of meters.)

In December of last year the third lander, the Soviet *Luna 13*, performed two experiments to test the properties of the lunar soil, in addition to obtaining pictures of the surface. In one experiment, a pointed rod was driven explosively into the ground. From the depth of penetration the Russian scientists deduced that the mechanical properties of the surface to a depth of 20-30 cm are similar to those of soil. In the other experiment, measurement of the scattering of gamma rays from a radioactive source led to the conclusion that the density of the surface does not exceed one gram per cubic centimeter—less than half that of terrestrial soil or rock. This low density agrees qualitatively with deductions from infra-

red and radio emission measurements.

In April of this year *Surveyor 3* landed and, in view of its own television camera, carried out an experiment to determine mechanical properties of the surface. A scoop on the end of an extensible arm dug several trenches and also dumped soil on one of the footpads for examination. More force was required to dig as the trenches were made deeper, indicating an increasing degree of compactness with depth. The cohesive nature of the surface layer was confirmed when the walls of the trenches remained perpendicular, without collapsing, even at a depth of 15 centimeters. Thus *Surveyor 3* strengthened the conclusions from earlier landers regarding the mobility of an astronaut on the surface.

In recent months the highly successful *Lunar Orbiter* series of spacecraft has greatly extended the photographic coverage of earlier impacters and landers to both the near and far sides. The *Orbiter*, built and operated by the Boeing Company under the project management of NASA's Langley Research Center, uses film rather than the television pickup system of earlier photographic craft. The pictures are developed on board, stored, and then scanned for transmission at a convenient time. The system can resolve surface details one meter in size at the nominal minimum altitude of 46 km. The four *Orbiters* launched to date have returned many photographs of potential *Apollo* landing sites for evaluation by NASA, as well as some of purely scientific interest.

The *Orbiter* photographs confirm some of the general findings of earlier photographic probes and have also provided new information. Among the smallest craters, the number increases as the size decreases, a point noted also in the restricted coverage of the *Rangers*, *Luna 9* and *Surveyor 1*. The pictures of the far side have revealed that the *maria* are by no means as extensive in the averted hemisphere as on that facing Earth, a fact for which there is no generally accepted explanation. The photographs also show that a process known as mass wasting is moving material from higher to lower elevations, under the influence of gravity. The erosive agent in this case is meteoritic bombardment rather than the action of water and air as on Earth. Mass wasting may be the reason why fewer craters are seen on slopes than on level ground.

The photographs have brought into view many rocks, particularly near certain craters. Such rocks were most probably ejected along with finer debris at the time the impact craters formed. That rocks should be present on the lunar surface had been inferred from radar data. They were scarcely seen in the *Ranger* photographs but showed up conspicuously in the *Luna 9* and *Surveyor 1* pictures. They appear to be scattered haphazardly over the surface.

Analysis of the radio tracking data of the *Lunar Orbiters*, and of the earlier Soviet lunar satellite *Luna 10*, has provided information on the gravitational field of the Moon, and therefore on its mass distribution. It has long been known that the Moon is not a perfect sphere but is slightly elongated in the direction of the Earth. Its gravitational field therefore perturbs the orbit of a

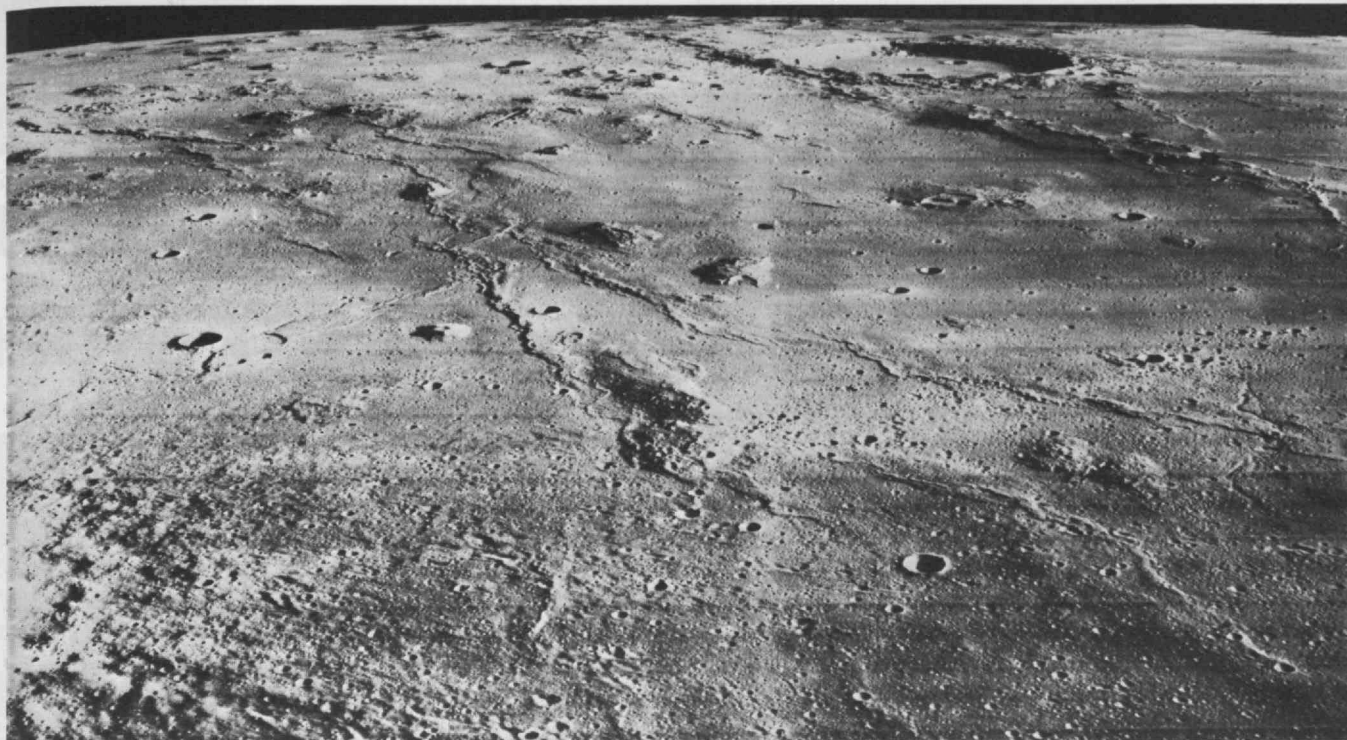


PHOTO: NASA

Oblique view of an area in Oceanus Procellarum taken by *Orbiter 2*. Of particular interest are the many dome-shaped features, which are from three to 15 kilometers in diameter and from 300 to 500 meters in height—similar in shape and size to volcanic domes seen in Northern California and Oregon. One interpretation is that they are the results of upward movement of magma which has extruded the surface layer or which in some cases has emerged as lava. The wrinkle ridges may similarly be extrusions along faults. The crater Marius (diameter 40 kilometers) can be seen in the right-hand background.

lunar satellite. From analysis of *Luna 10's* orbit, Constantine L. Goudas of Boeing Scientific Research Laboratories has concluded that the Moon's mass distribution is essentially homogeneous, with density constant or possibly increasing slightly with depth.

The Vital Questions—Before and After Apollo

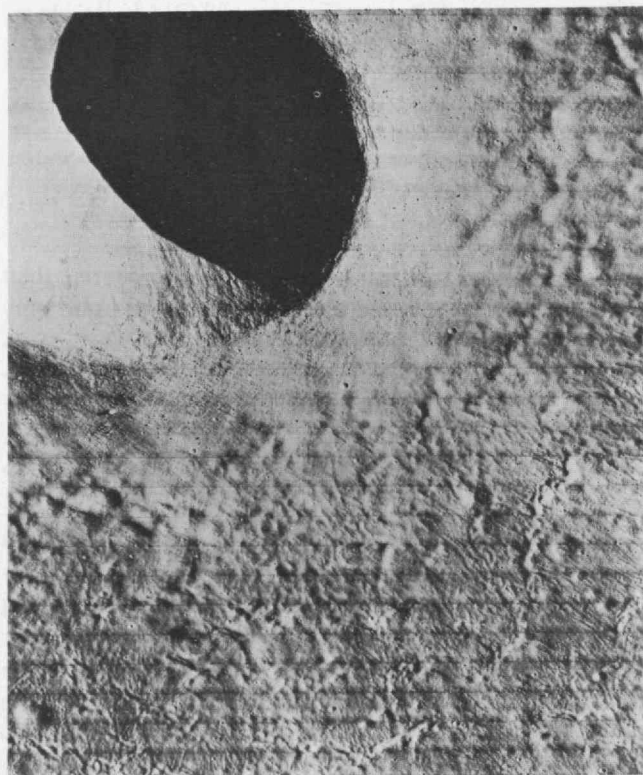
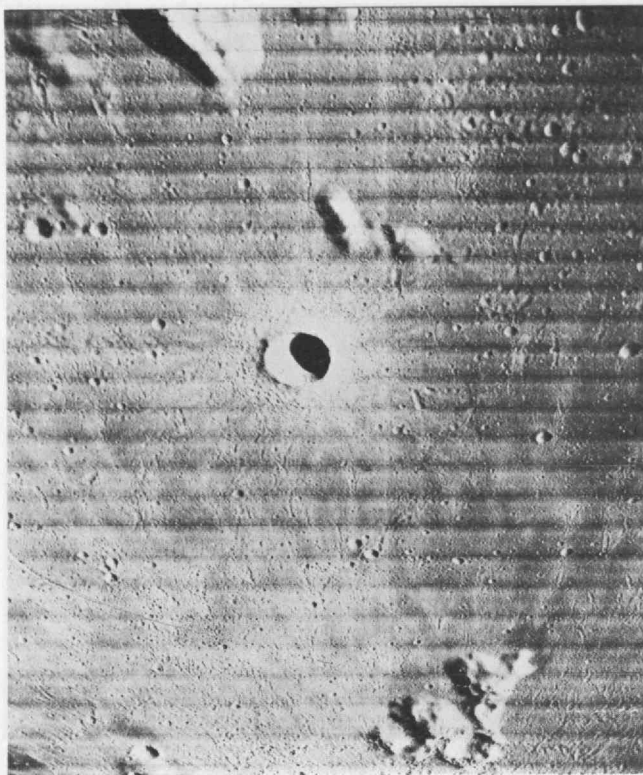
Despite the wealth of information contained in the photographs from the several orbiters, impacters and landers, lunar scientists are by no means unanimous in their interpretation.

The experts do agree that an influx of interplanetary matter—dust, meteoroids, and probably asteroids and comets—has bombarded the Moon during the several billion years since its formation. This influx of particles of all sizes has made the surface a field of fragmented debris, marked with primary impact craters on a scale of kilometers to a hundred or so kilometers in diameter, through secondary craters and smaller primary impact craters on a scale of meters to hundreds of meters, to the microrelief on a scale of centimeters to millimeters or less. This blanket of rubble is weakly cohesive and loosely packed. Its depth is unknown and probably variable, but seems most likely to be in the range 5-50 meters over much of the surface. The young primary impact craters, which have not yet been strongly “weathered” by the erosive action of falling particles, probably contain

more bare rock, in walls, floors or rock debris, than older craters, although to date this has shown up in only a few *Orbiter* photographs. These surface characteristics are consistent with observations by photometric, infrared, radio and radar methods.

It is also generally recognized that internal processes, including subsidence, have been responsible for some of the lunar features, such as wrinkle ridges, fissures and other lineaments, slump features, certain craters, and possibly the *maria*. But the extent of this volcanism is the greatest cause for disagreement among lunar experts. Whether the lunar interior is, or has ever been, hot enough to be molten is strongly debated. Those who consider the *maria* and flooded crater bottoms to be lava flows have continued to find evidence of lunar volcanism in the close-range photographs to support their earlier views derived from telescopic observations. Others contend that there is insufficient radioactive heating for the internal temperature to be very high and point to the significant departure of the shape of the Moon from hydrostatic equilibrium as proof. It is of interest, and not without amusement, to the students of the Moon to note how the experts use evidence from the photographs to support their differing views!

What more can we expect to learn about the Moon in the next two years before the manned landing? It is unlikely that the question of lava flows and the tempera-



PHOTOS: NASA

Orbiter 3 photograph of a region near the center of the Moon's visible disk (top). The crater with the bright halo is Mösting C (diameter 3.8 kilometers), a relatively young feature on the lunar surface. Infrared measurements made during the eclipse of December 19, 1964, showed that, like many other craters with rays and bright halos, it cooled more slowly than its surroundings. The data, when corrected for the small size of the crater relative to the sensor resolution, show that it is one of the strongest of the hundreds of thermal anomalies found during that eclipse. High-resolution (X8) photo (bottom) shows a portion of Mösting C and immediate surroundings. Boulders can be seen around the rim. Theory indicates that bare rock surfaces and boulders can contribute to anomalous thermal behavior.

ture of the Moon's interior will be resolved in that period. We can anticipate more photographs of areas of scientific interest from the remaining *Lunar Orbiter*, especially if NASA finds that it now has sufficient pictures to evaluate landing sites. Close-range photographs of the Aristarchus region may provide a clue to the cause of the transient changes in color variously ascribed to luminescence of the surface material or to escape of gas, which have been seen there. Over 200 sightings of transient lunar phenomena have been reported during the course of the last two centuries, the Aristarchus region alone being the site of about one-fourth of them.

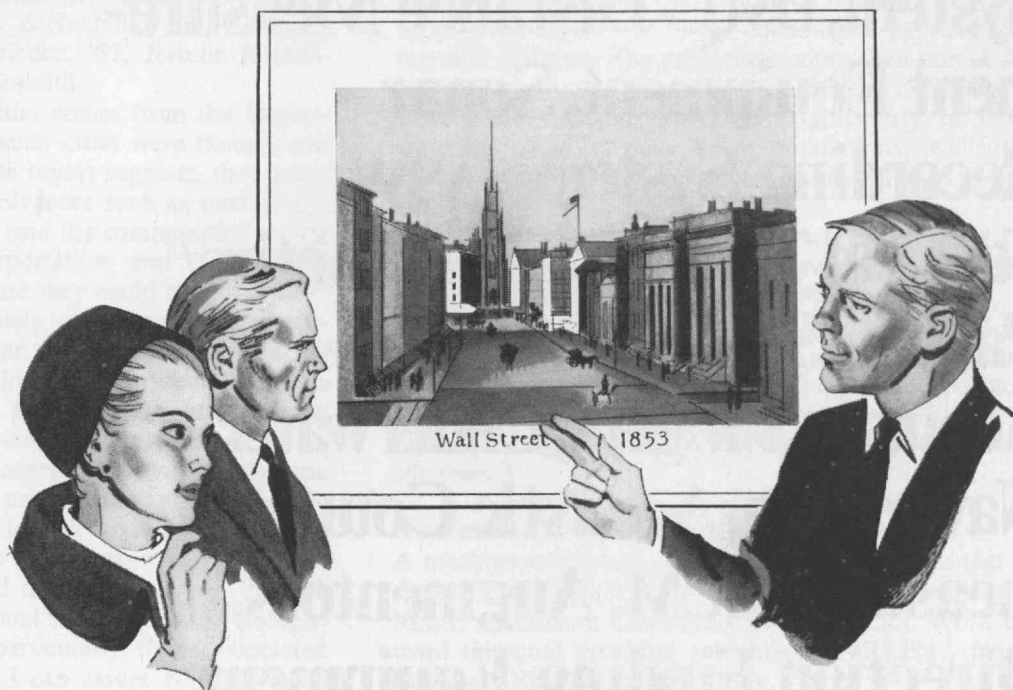
Future *Surveyors* and Soviet landers will give additional information on local surface conditions. Although one should hope for surprises, it is probable that future pictures will be in the main similar to those obtained by the four landers to date. Some insight may be gained regarding the surface composition from an alpha backscatter experiment scheduled for a later *Surveyor*. Alpha particles from a radioactive source will be directed toward the surface and the energy with which they recoil measured; from this, the mass of the scattering atoms can be determined.

It is also expected that better knowledge will be gained in the next two years of the Moon's gravitational field, and therefore of its mass distribution, from analysis of perturbations of the orbits of past and future orbiters, both American and Russian.

The many remaining questions, the conflicting hypotheses, the mystery which from antiquity to the present has been and is the riddle of the Moon—will these be solved as a result of the manned landing in 1969? It seems clear that manned on-site inspection and subsequent sample analysis in terrestrial laboratories will unequivocally define the local surface structure and composition. This knowledge will provide a basis on which further meaningful deductions may be made. The manned landing will confirm and extend our knowledge beyond that previously existing in the same way that *Ranger 7*, *Surveyor 1* and the *Orbiters* have extended our knowledge over that existing before their respective findings.

Yet, just as these vehicles provided answers to certain questions but generated others, it seems safe to predict that the manned landing will do the same. Does the Moon have a molten core? Are there moonquakes? What is the heat flux from within? Some of the experiment packages to be emplaced by the astronauts may eventually answer these questions. Does the chemical composition of the surface vary with position over the surface? Why is the Aristarchus region so unusual? Just what details are responsible for the enhanced infrared and radar characteristics of Tycho and other rayed craters? Only a beginning to the solution of these and other questions raised in earlier paragraphs will be made. Much more extensive exploration will be required before we understand our satellite as it is today, not to mention its probable genesis and evolution. The first manned landing will not be the denouement of the lunar play; it will be merely the close of the first act. ■

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Trend of Affairs

M.I.T. Looks at the City

The development of entirely new cities on a large scale was suggested as one solution to urban problems, in a report from M.I.T. presented this spring to the Senate Subcommittee on Executive Reorganization by Jerome B. Wiesner, Provost of M.I.T.

Provost Wiesner had prepared the report, entitled "Urban Problems in the Light of Technological Opportunities," with the cooperation of a number of M.I.T. Faculty members. These included Professors Leonard J. Fein, Ithiel D. Pool, Carroll L. Wilson, '32, Charles L. Miller, '51, Richard L. deNeufville, '60, Kevin A. Lynch, '47, Bernard J. Frieden, '57, Jerome Rothenberg, and Walter A. Rosenblith.

The proposal for new cities comes from the Department of City Planning. If such cities were thought out on a grand enough scale, the report suggests, they could incorporate technological advances such as nuclear energy to provide fresh water and the communities' power needs, new forms of transportation, and the handling of wastes and pollutants. And they could also act as living laboratories for completely new approaches in education and housing. Nuclear desalination would allow such cities to be placed in locations on the coast so far away from water supplies that they are economically unfeasible in terms of conventional technology.

Obviously new urban centers represent only one prong of the attack against urban problems. The M.I.T. experts found a striking failure in dealing with existing communities to use modern management tools and concepts. Provost Wiesner told the subcommittee, "I have spent most of my professional life working on complicated technical systems, particularly those associated with national defense. . . . I can assure you that none of these would have ever come into being if the planning and management of them were as chaotic, halting and changeable as that employed in dealing with urban affairs."

A second major handicap in urban affairs is the lack of qualified experts in the field. Unfortunately, this problem has no solution in view: "The present hopelessness in too many urban areas discourages enthusiastic and idealistic young people from entering the urban professions which are in such need of this transformation."

The four main problems facing the city today, according to the report, come in information management, housing, medical care, and education.

One group of M.I.T. professors proposed the creation of urban information centers. These would allow urban planners and managers to delve into masses of data previously unavailable to them. In addition, the computer will enable them to study the interacting subsectors of cities—to investigate the effects of changes in one area on the rest.

In the area of housing, the report notes that the industry has lagged behind other industries both in research and development and in moving toward mass production. Federal and state action, the group recommends, should move toward greater code uniformity and reasonable performance standards.

In the realm of medical care, Provost Wiesner stated, we must aim at a total community approach, emphasizing education about the standards of good health and providing the necessary elements and support to achieve these standards. As in many other aspects of urban problems, the technological tools are available, but we have not yet taken advantage of them. With this end in view, the creation of a central authority which would have the respect of the nation and the communities in dealing with health problems seems imperative.

Education is one of the keys to the present problems of the city for two reasons. Effective education is essential to give the children of the poor and disadvantaged an equal opportunity to participate in society; and many families are deserting the centers of cities for the suburbs in the search for better educational opportunities for their children. The problem is more than one of deteriorating physical plants; the educational needs in the cities have changed drastically, particularly in cities with large and growing Negro populations, while the school systems have not evolved rapidly enough to deal with the changing needs.

Much experimentation is necessary in the quest for urban solutions, Provost Wiesner concluded. And this will require a great deal of both time and money. "I understand that the HUD R and D initial annual request is for \$20 million," he told the subcommittee, "and some members of Congress think that this is too much. Unless you raise your sights, we will be back here in five years discussing a more difficult and more hopeless situation." □

Toward the Speaking Machine . . .

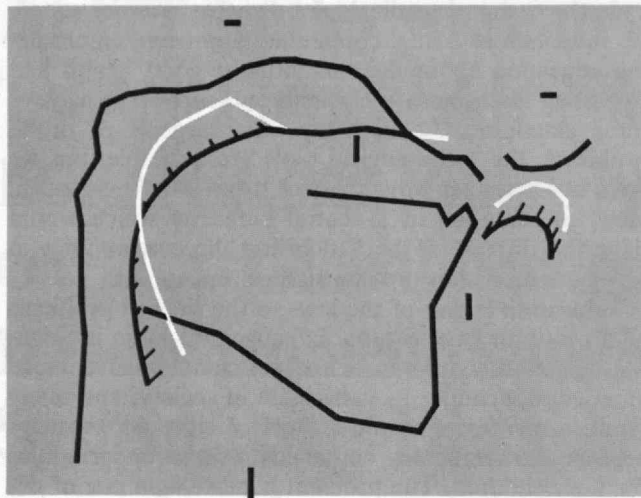
A machine which will reliably reproduce written text in spoken form within a year is the aim of a project at M.I.T.'s Research Laboratory of Electronics. Work toward this goal provided a highlight of RLE's Annual Research Review in early May.

The project, undertaken by Professors Samuel J. Mason, '47, Francis F. Lee, '50, Donald E. Troxel, '60, Murray Eden, and Kenneth R. Ingham, started in January of last year. The group hopes to produce portable units which will scan printed pages and read their contents to the blind.

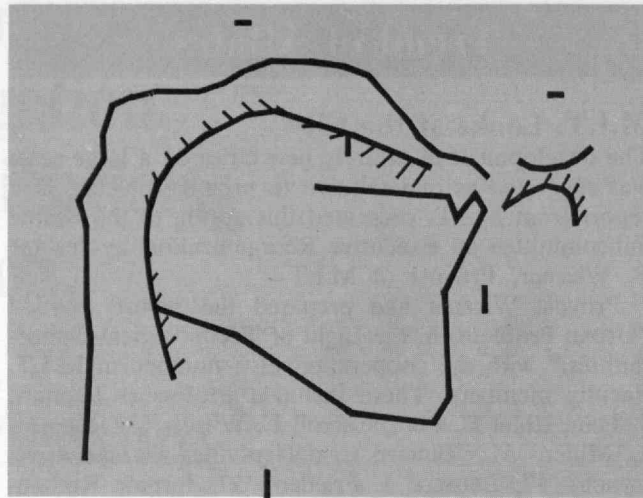
The machine consists of three basic parts. A character recognizer scans printed English text, and translates it into individual letters and punctuation marks. These signals pass into a translator, whose function is to convert the printed letters into the fundamental units of speech, known as phonemes, and to put the phonemes into the context of the sentences in which they appear. The phonemes, with appropriate stresses and pauses added, then pass into a speech synthesizer, which utters the speech through a loudspeaker.

The group completed the character recognizer a year ago. At the RLE Research Review, Professor Lee reported on two new developments, in the speech synthesizer and part of the translation unit.

The translator consists of two parts. The first—a grapheme-phoneme translator—converts letters received from the character recognizer into phonemes. This input then passes to a syntax analyzer, which introduces the pauses and stresses necessary to give the listener clues to the context of the speech, and hence greatly aid comprehension of the output from the speech



Two stages in the production of the phrase "tuu," taken from a computer display of speech production. This continuous, articulatory model of the vocal tract has been developed by RLE's William L. Henke, '62. Left shows positions of the vocal tract as pronunciation is changing from the "t" to the "uu" sound; black lines represent the vocal tract; white lines the goals for which different parts of the tongue and lips are aiming, and the short lines perpendicular to the tongue and lips the forces driving them towards the goals. Right shows the situation 46ms later, during pronunciation of the "uu" sound.



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synthesizer.

So far, only the first half of the translator is available to the RLE researchers. In their tests they have been using an electric typewriter to provide the input to the translator, thus by-passing the character recognizer, in the interests of saving computer time. (There is, however, no engineering reason why the character recognizer should not be incorporated at this stage.) Output from the translator is fed into the speech synthesizer, which produces the corresponding machine speech.

In view of the absence of the syntax analyzer, the group is very pleased with the performance of the machine. A number of visitors to Open House recently had the opportunity to hear the machine's performance at first hand. In the eyes of its mentors it dealt adequately with such sentences as "The monkey chatters happily," "I'm going home, and I'm never coming back," and "God is dead," although some of the hearers, including Technology Review's reporter, were more skeptical of its intonation.

Professor Lee told Technology Review that the development of the syntax analyzer will greatly improve the machine's speech. To this unit will fall the tasks of distinguishing between such possibilities as "refuse" (noun) and "refuse" (verb), of translating "quadruped" as a noun rather than a past participle, and of emphasizing the "e" at the end of words such as "apostrophe" and "recipe." While English speakers treat these linguistic quirks as natural parts of their cultural heritage, machines have to learn them from scratch. But these problems can be solved, and a reliable reading machine is a strong possibility before RLE's next annual report. □

... and Modeling Speech Production

Another form of tie-up between speech and computers now underway at RLE aims to produce a dynamic computer model of the vocal tract during the process of speech. William L. Henke, '62, Assistant Professor of Electrical Engineering, reported his work at the same research review.

Generally, researchers in the field of artificial speech treat speech production at two levels: the inputs from the brain in the form of a higher level linguistic description, and the acoustic production of the relevant sounds. Professor Henke's work fits between these two categories, at the articulatory level of speech. His model takes account of the fact that the individual, discrete phonemes, which represent the input from the brain, lose some of their identity in articulation. As spoken, phonemes are no longer discrete entities; the pronunciation of any one is influenced by those preceding and following it. As they pronounce one phoneme, parts of the vocal tract are already preparing to move into position for the next.

Professor Henke's model deals with two aspects of the vocal tract: the actual states of the tract at given times, which describe the positions, shapes and velocities of its constituents, and "operators" on the vocal tract, which can be regarded simply as forces moving the system toward positional goals associated with the phonemes spoken. These goals correspond to the speaker's intentions, although actually achieving them is sometimes physiologically impossible (*see figure above*). Since the model is dynamic, it shows the changes in these goals during continuous speech.

As a convenient method of comparing the model with reality, Professor Henke has superimposed x-ray movies of the human vocal tract during speech on continuous computer displays from his program. Such displays have also served to improve the computer model. □

Probing the Secrets of Life

"Our investigations into the structure of ribonuclease are now at a stage at which we can guarantee success to researchers joining us."

This apparently innocuous statement—by Dr. David Harker of the Roswell Park Memorial Institute in Buffalo, New York, at an M.I.T. Biology Department seminar this spring—has very special meaning. For Dr. Harker is leader of the group which recently announced its successful determination of the structure of ribonuclease at a resolution of 2 angstrom units [A], and he was expressing his confidence that this success is the beginning of a significant step forward in the life sciences.

Ribonuclease is the enzyme which enables the ribosomes of the living cell to assemble proteins from amino acids, according to instructions received from molecules of DNA (see "Molecular Biology and the Future of Man," Technology Review, March, 1967). It is only the second enzyme whose structure has been determined; a group at the Royal Institution in London determined the first—lysozyme—last year. The importance of such studies is that they may give molecular biologists some indication of just how the ubiquitous enzymes function.

Dr. Harker's group determined the structure of ribonuclease by the classical method of x-ray analysis. Owing to the great complexity of such molecules, this is a long and difficult operation—the work started in 1950—and requires the introduction of heavy atoms at certain points in the molecule as "markers."

Dr. Harker said that he has been encouraged that a number of other groups working on similar problems have been able to fit their results into the structure determined by his group, even though a 5.5 A resolution structure announced recently by a group at Birkbeck College, London, shows certain discrepancies with his model.

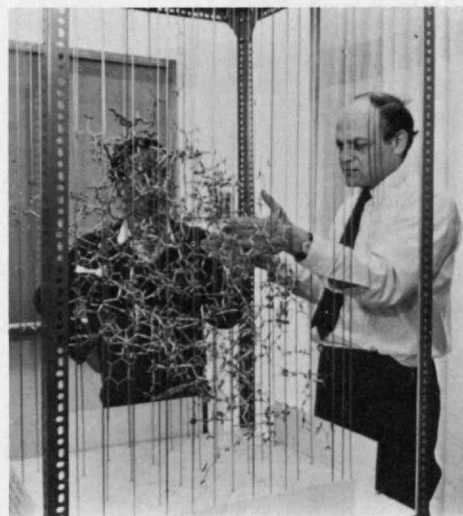
Dr. Harker emphasized that the work is far from finished. He intends now to refine the model to a resolution of 1.1 A, and to determine the structures of ribonuclease from a number of different sources; his group performed their measurements on bovine ribonuclease, but Dr. Harker hopes to look at ribonuclease from pigs, sheep, and even vegetables, to discover the basic contribution of this enzyme to the processes of life. □

Active Search for UFO's

During the last 20 years, many people in the U.S. and abroad have spotted unidentified flying objects (UFO's), but their reports have generally been treated passively. The time has arrived for scientists to take an active approach to such sightings, by endeavoring to obtain hard data in the form of photographs and by thorough analysis of all sightings.

This is the opinion of J. Allen Hynek, Chairman of the Department of Astronomy at Northwestern University, and, since 1948, scientific consultant to the Air Force on UFO's, who spoke to the M.I.T. Club of Washington at the Department of the Interior auditorium this spring.

When he first became the Air Force's "flying saucer" consultant, Professor Hynek said, he believed that all reported sightings of UFO's could be explained as familiar objects seen under unusual circumstances. Many sightings definitely fall into this category, but his investigations have shown that a small residue just cannot be



Model of the enzyme lysozyme, constructed by M.I.T. biology students under the direction of Alexander Rich, Professor of Biophysics (right), and Sung H. Kim, Research Associate in Biology (behind model). The group at the Royal Institution, who last year determined the structure of this enzyme, supplied the M.I.T. biologists with the coordinates for the model. Studies of enzyme structures such as lysozyme and ribonuclease, the only other enzyme whose structure is known at present (see story left), will give biologists new insight into the basic processes of life itself.

explained in this way. While he maintains a "healthy scientific skepticism," Dr. Hynek told his audience, he can no longer fully accept his original hypothesis, although it is common among many scientists.

Three factors have led him away from his original belief: the sheer number of sightings, their persistence over recent years, and their worldwide occurrence. According to a recent Gallup poll, five million Americans have seen UFO's, although the Air Force files list only 12,000. Many people have written to Professor Hynek after hearing his lectures to tell him of sightings they had not reported before, presumably because they feared ridicule; among these reporters have been a number of reputable scientists, fully trained in objective, scientific observation.

How can scientists put UFO sightings onto a quantitative basis? Professor Hynek listed two complementary approaches, one aimed at probing sightings and the other intended to obtain "hard" evidence of UFO's.

Scientific investigation of sightings, as envisaged by Professor Hynek, involves two forms of analysis. For the sake of reliability, he would apply it only to those sightings witnessed by more than one person. A group of physical scientists would first give each sighting a "strangeness index," on a scale of one to five. This would indicate the likelihood of explaining the sighting in terms of conventional phenomena (a high score indicating a sighting very hard to explain). Then, a group of psychologists and social scientists would be given a dossier on each witness of the UFO and asked to assign a "credibility index" to the individuals, on a scale of one to 10. To prevent prejudice, the psychologists would *not* receive the sighting reports. The sightings deserving of further study after these analyses would obviously be those falling in the high strangeness-high credibility category.

The search for scientific evidence of UFO's would aim to obtain photographic and spectroscopic evidence of

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them. One disturbing factor for UFO enthusiasts is the lack of really reliable photographs. Professor Hynek suggested that local organizations could equip police cars with loaded cameras, and that in UFO "hot areas" readiness teams equipped with cameras, spectroscopes, and tape recorders could be put on alert to rush to the site of any reported unidentified flying object.

Although he himself has not seen any UFO's, Professor Hynek carries a camera and portable spectroscope in his brief case, just in case.

What are the chances that UFO's are harbingers of intelligent life elsewhere in the universe? "We would be cosmically provincial," Professor Hynek commented, "to think that the sun is the only star with civilization around it."

Whatever the nature of the UFO's, we are now in a position to investigate them scientifically. As Professor Hynek concluded, "If there is nothing to UFO's, let us find out; if there is something to them, we are at the edge of the greatest change in our ideas since Copernicus—so let us be ready for it!" □

Quantum Theory and the Genetic Code

Even today when scientific problems are frequently attacked on a multidisciplinary basis, certain combinations of scientific fields remain somewhat unlikely. For example, one hardly expects to hear quantum theory and genetics mentioned in the same department, let alone in the same research paper. Yet in a recent seminar at M.I.T.'s National Magnet Laboratory entitled "Some Aspects of Quantum Genetics," Professor P. O. Löwdin, of the University of Florida, on leave from the University of Uppsala, Sweden, highlighted a quantum theoretical approach to complex biological molecules which has intriguing implications for the code of life.

The "code of life" was cracked in 1953 by Crick, Watson and Wilkins of Cambridge University. According to their findings, all the hereditary material of the living cell is contained in deoxyribonucleic acid (DNA). When the biological processes in the cell are operating, this information is carried by the substance known as messenger RNA to the ribosome, the "factory of the cell" which manufactures protein (see "Molecular Biology and the Future of Man," Technology Review, March, 1967).

DNA consists of two chains wound together into a helix. Attached to the chains are large numbers of four different bases; the sequence of these bases along the chains determines the DNA's blueprint for constructing specific proteins. The two chains are linked together in the double helix by hydrogen bonds: hydrogen atoms on bases attached to one of the chains are attracted to parts of nearby bases on the other chain which have a predominance of electrons. In fact, the effective part of the genetic code consists of this thin layer of hydrogen bonds between the two strands of DNA; stripped of all non-essentials, then, the genetic code is made up of protons and pairs of electrons.

Any genetic theory must account for the formation of mutant forms of life. External influences such as cosmic rays certainly cause some of these changes, but it is also

known that mutant forms can arise spontaneously. A possible way of producing these mutant forms would be to alter the bases between which hydrogen bonds can form. In "normal" DNA, adenine on one of the chains bonds only with thymine on the other, and cytosine bonds only with guanine. However, according to Watson and Crick, tautomers of these bases on one chain—which have exactly the same atoms, but slightly different structural arrangements—could link to the wrong partners on the other, and this may give rise to a discontinuous change of the genetic code. One of the major objections to this mechanism is that it would give rise to far more mutants than actually occur in practice, since the tautomeric forms in the nutrition material in the cell are not as rare as one originally expected.

Professor Löwdin analyzed this difficulty in view of the so-called Y-model of DNA-replication. By studying the region of DNA-synthesis, it may be shown that the incorporation of a single tautomeric base is energetically highly improbable in comparison to the incorporation of normal bases. This mechanism does not prevent the incorporation of tautomeric base pairs, but the process is indeed rare.

Another difficulty in the Watson-Crick model follows from the well-known fact that the proton in a hydrogen bond in certain cases may have two classical equilibrium positions separated by a potential barrier and, if the proton moves from one position to the other, the genetic code is changed.

Can we measure the likelihood that mutants will arise also in this way? It is at this point that quantum theory enters the picture, through the well-known tunneling effect discovered in 1928 by Condon and Gamow. In the case of hydrogen bonds its effect implies that the proton can spend some time near each of the pairs of electrons at either side of the bond even though it does not possess sufficient energy to travel the energy hill between these two positions: it actually tunnels under this energy hill.

What can studies of the tunneling effect tell us about the occurrence of tautomerism in DNA bases and hence the possibility of mutant forms of life? Professor Löwdin told his audience of work by his group at Uppsala. The group has calculated the effects of moving the protons in hydrogen bonds to different positions between their bases, to calculate the amount of tunneling that takes place in DNA. They have translated these results into probabilities that tautomerism will occur in DNA, and hence found the rate of spontaneous mutation. Their results strongly support the Watson-Wilkins-Crick model for the code of life. Indeed, in some ways the results are too good to be true, said Professor Löwdin.

An interesting implication of this work is that proton errors may be responsible for biological aging: when messenger RNA picks up information from DNA it may gradually erode the proton-electron source of the message, in just the same way as the stylus of a record player gradually spoils the quality of records. Professor Löwdin's team is currently working on this problem.

At the end of his seminar, Professor Löwdin was asked about the attitude of biochemists to this work. Unfortunately, he confessed, they have been either violently opposed to it or exceedingly enthusiastic. By now, many biologists seem to realize that the elementary

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chemical processes in the cell involve the fundamental particles in a very explicit way and that quantum theory may be the natural theoretical tool for treating these phenomena. □

A Skyscraper in a Tube

The John Hancock Center now under construction as Chicago's tallest building may be "one of the notable engineering achievements of our time, perhaps a breakthrough in structural engineering technique."

The efficient structural design of the new building has been described in the *Journal of the Boston Society of Civil Engineers* by E. Alfred Picardi, '44, who was chief structural engineer for Skidmore, Owings and Merrill in Chicago at the time of the building's design. Two features make possible its structural efficiency: the building is tapered in a single straight line from base to top, and the framing members are clearly expressed on the exterior of the building.

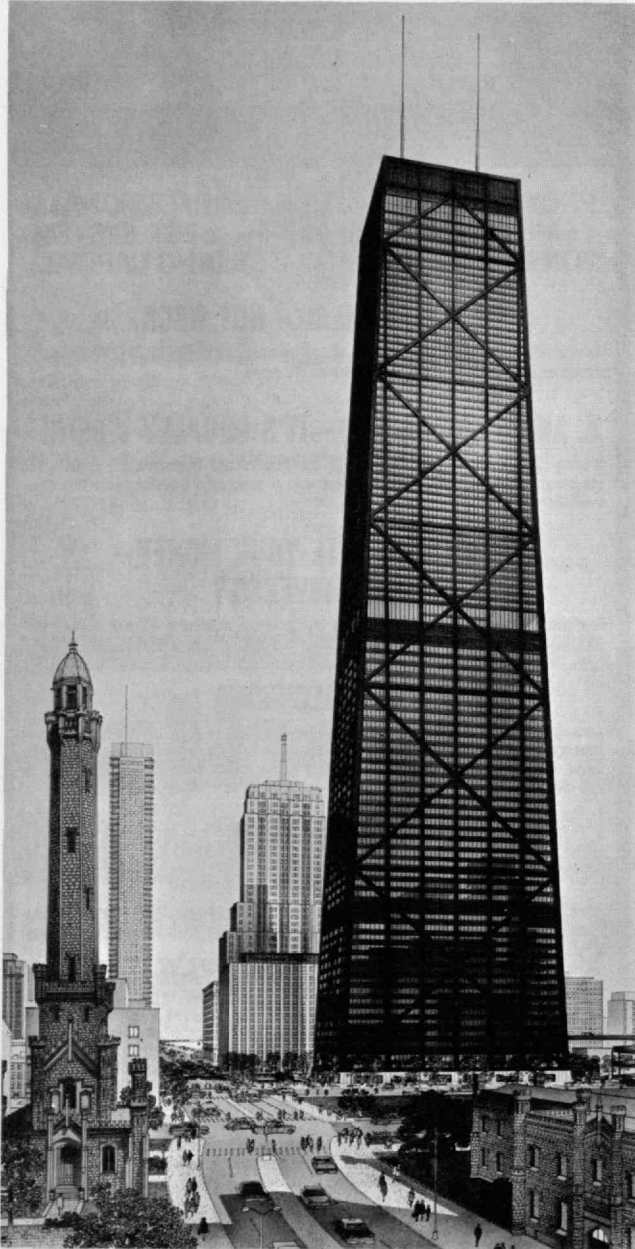
These features—taper, exterior bracing, and square floor plan—have resulted in an exterior structural system designed literally to act as a tube carrying all lateral loads and a portion of the vertical loads. The Skidmore, Owings and Merrill engineers found that "a minimum number of diagonals added in the plane of the exterior walls could accomplish this tube or rigid box effect," Mr. Picardi writes. The result is "an extremely stiff and efficient structure for both gravity and wind loading. Though the building will rise to 1106 feet above the street (with two television masts reaching 1450 feet)—the same as the Empire State Building—the weight of its steel frame is typical of buildings less than half as tall. (Since completing this assignment for S.O.M., Mr. Picardi has become executive vice-president of P&W Engineers, Inc.) □

Industry Comes to Puerto Rico

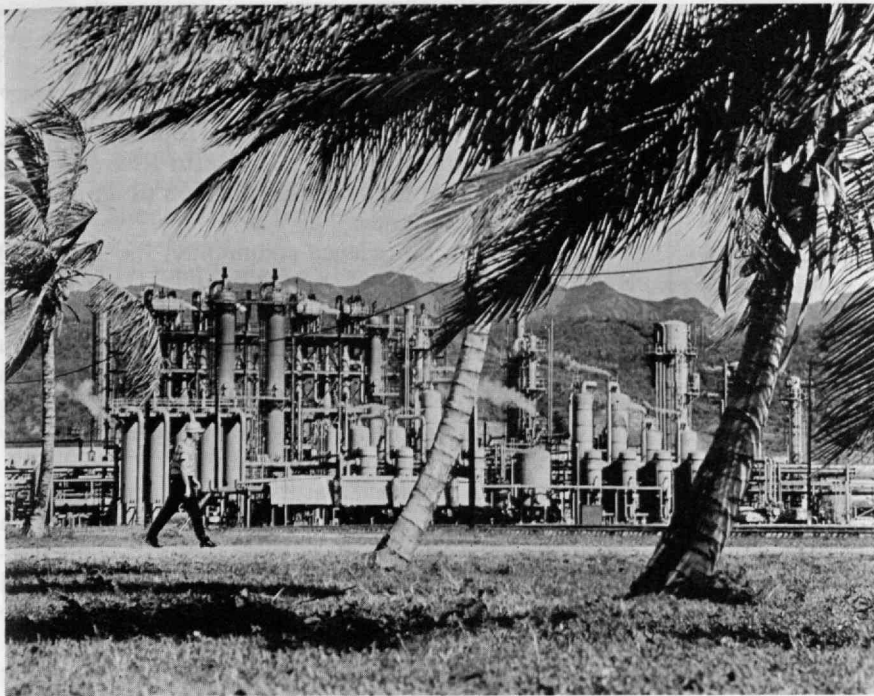
Riding atop the crest of an industrial wave that has been washing its sun-drenched shores for a quarter century, the Commonwealth of Puerto Rico is now preparing to secure its economic future through a major assault onto the beachheads of science and technology. The Commonwealth, in fact, has already started to implement ambitious plans to foster a first-rate scientific tradition on the 100-mile long, 30-mile wide, subtropical island.

Considered an undeveloped or backward region as recently as World War II, over the past 25 years the tiny island has tripled gross domestic product (\$3.1 billion in 1966), multiplied by 20-fold income from manufacturing (\$612 million in 1966), and raised per capita income by a factor of seven (\$955 in 1966).

But Puerto Rico's population, now 2.6 million, has increased since 1960 at the rate of 2.4 per cent per annum, one of the highest rates in the world and twice the stateside average. Unemployment still hovers between 10 and 25 per cent, depending on how the statistics are interpreted. To keep up with the island's population growth, the Planning Board of Puerto Rico intends to increase the gross domestic product two-and-one-half times by 1975 and to double per capita income to \$1852. They would also like to create 71,000 net additional



The 100-story John Hancock Center in Chicago has a structural steel frame which compares in weight with those of conventional buildings less than half its height. Credit for the achievement belongs to William E. Hartmann, '37, and his associates at Skidmore, Owings and Merrill in Chicago—notably E. Alfred Picardi, '44, formerly chief structural engineer at S.O.M., and Fazlur Khan, project engineer—structural. The building is based on a unique diagonally braced exterior column system which operates like a tube to carry all lateral and most vertical load. The principal architect is Bruce J. Graham of S.O.M.; structural consultants are Paul Weidlinger and Ammann and Whitney; and Tishman Construction Company is general contractor.



Union Carbide Caribe facility at Penuelas, on the south coast of Puerto Rico, which manufactures alcohol intermediates. Like many other industries in the Commonwealth, this facility is in the process of expansion. In the effort to attract further industries to the island, Puerto Rico's planners are developing a Scientific-Technological Center, loosely based on the Route 128 concept.

manufacturing jobs over the next 10 years and to produce a net income of \$1.4 billion from manufacturing.

These goals are to be realized largely through the continuing attraction of stateside industries to the island. But to assure a competitive position with the states, the island will have to increase its productivity, which, for many of its industries, is currently less than one-half that on the continent. This the planners hope to achieve by developing scientific and technological competence on the island. And central to this aim is the creation of a Scientific-Technological Center, sometimes referred to as a scientific community, where the island's research and development activities will be concentrated.

The over-all concept for the research park parallels the pattern of Boston's Route 128, whose proximity to M.I.T. is more than mere coincidence. Aware of this correlation, the Puerto Ricans have purchased a 300-acre site for their center near the University of Puerto Rico's College of Agriculture and Engineering at Mayaguez. This is the island's only engineering campus. Though likely to be independent of the university, the center will be operated in close relationship with it, perhaps through an overlapping board or directorship.

In the early stages of the center's development, fundamental research will be played down in order to emphasize applied research and engineering projects which promise more immediate applicability to the island's industries and economic needs. This element in the strategy has been fitted to match Puerto Rico's still semi-developed status, a status which demands a quick, assured payoff from investments in the economy. The strategy, furthermore, calls for an emphasis on technical fields related to the island's unique geographical position, climatic characteristics, and existing economic strengths. Among the fields to be pushed are:

- **Sugar chemistry.** The predominant agricultural crop on the island is sugar cane, which accounts for nearly 50 per cent of the land currently under cultivation. An institute for sugar research already exists on the island.

- **Petrochemistry.** Industries' investments in oil refineries and petrochemical plants total over \$300 million; by 1975 the investment is expected to reach the \$1 billion level.

- **Agriculture and food technology.** The island does not now have an adequate agricultural productivity to feed its 2.6 million inhabitants, but it does have the potential. Meanwhile, Puerto Rico's proximity to the South American continent suggests a major opportunity for processing agricultural products into foodstuffs for resale in Latin American markets.

- **Nuclear physics.** A technical field that at first might appear outlandish for a semideveloped region, the island's nuclear research activities coincide with her plans to rely on nuclear power henceforth when expanding electric generating capacity. The island already maintains a nuclear research and training center at Mayaguez, and an advanced concept nuclear power plant at Rincon.

- **Pollution control.** With Puerto Rico's rapid industrial expansion, pollution has stirred public controversy, and the Commonwealth leaders hope to minimize despoilation of the environment through effective antipollution controls.

- **Oceanography and fisheries.** This field, perhaps more than any other, appeals to university officials and government planners in Puerto Rico who intend to have their island develop a prominent position in the marine sciences and technology. "Within five years," says Jose E. Arraras, Chancellor of the University of Puerto Rico at Mayaguez, "we hope to have a strong ocean-oriented program in Puerto Rico." The 29-year old chancellor pointed to the island's year-round subtropical climate and location near the Puerto Rican trench, the Atlantic's deepest, as two advantageous features.

The Mayaguez campus has an Institute of Marine Biology, and it recently proposed the establishment of a more comprehensive Department of Marine Science and Technology, which, Arraras said, is certain to be approved. In addition, he went on, a private foundation

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has agreed to finance a School of Tropical Fisheries. Hopes are also running high that Puerto Rico will be a recipient of federal funds for the creation of an oceanographic research center.

To inaugurate the science community, the Industrial Research Laboratory of the Economic Development Administration plans to be the first newcomer to the Mayaguez center, relocating here from its current site in San Juan. (The Economic Development Administration is the Puerto Rican agency responsible for developing the research community. The agency is more commonly and lovably referred to as Fomento.)

The Puerto Rican Treasury Department has announced that it will build a standards laboratory at the center, and the Phillips Petroleum Company will likewise set up a research facility. Commonwealth Oil and Norwich Pharmacal have also expressed interest in the center.

Using a \$25,000 planning grant from the Commerce Department, Fomento has also prepared a proposal for a technical information center and a program of supporting technical services to private industry. Further funding for implementing these activities is being sought from the Commerce Department under a grant from the State Technical Services Act.

In entering the highly complex world of science and engineering, Puerto Rico about two years ago turned to the National Academy of Sciences for expert counsel. Earlier this year, the NAS report was published. Prepared by a committee under the chairmanship of John C. Warner, retired president of the Carnegie Institute of Technology, the report confirms Puerto Rico's supposition: a technological competence has become essential to the island if it is to enlarge and even retain its burgeoning industrial establishment and realize more fully the economic potential within it.—*Stanley Klein, '58.* □

NASA and College Funding

Science-manpower training programs in the nation's colleges and universities may soon be \$10 million more affluent because a discriminating Congressman led the way to preventing what he felt to be an indiscriminate cutback in funds proposed by the National Aeronautics and Space Administration to support its Sustaining University Program in fiscal year 1968. Representative Joseph E. Karth, chairman of the powerful House Subcommittee on Space Science and Applications, found NASA's recommendation to reduce the SUP from \$46 million to \$20 million not acceptable. His subcommittee proposed, and the full committee accepted, an increase to \$30 million—a total that stands a good chance of coming out of Congress intact.

"NASA got the cart before the horse," Mr. Karth said. "Its proposed cutback was based on a study that has not yet been made. NASA hopes—but doesn't really know—that a survey it is making of possible increases in university-related programs in such agencies as the National Science Foundation and the Office of Education, among others, will disclose that the gap left by the NASA reduction has been filled. I think this is an illogical and unacceptable way to make policy.

"The need for increasing numbers of well trained scientists and engineers in the United States is critical. If some manpower base is going to be established, whether in NASA, the NSF, the National Institutes of Health, or wherever, we've first got to be sure that what we take out is being replaced by what we put in. We will be happy to take a good hard look at NASA's study when it is completed, but let's make our decisions on facts, not forecasts.

"NASA's total budget will reflect constraints suggested by the Bureau of the Budget, but the cuts will show up in some of the so-called program areas where they can be justified much better than reductions in funds designed to help meet critical science-engineering manpower needs of the nation. We are recommending that our increase of \$10 million, none of which is for bricks and mortar, be earmarked specifically for the university-related program and not diverted to other uses."

Budget Bureau "constraints" on NASA's total budget are an index to the socio-political dilemma from which the Johnson Administration seeks some escape—reconciling the demands of the nation's involvement in Vietnam with the demands of faltering programs designed to establish the Great Society. NASA is hung up between these horns because it is neither particularly political nor essentially social. Furthermore, NASA's steadily climbing budget could not continue its upcurve now that most of the agency's big hardware and technological problems have been resolved.

Perhaps the happiest man at NASA over Representative Karth's beneficent intervention is Francis B. Smith, recently appointed assistant administrator for university affairs. He points out, however, that his agency's relations with the universities should not be judged by the Sustaining University Program alone. "Over \$100 million will be spent by NASA with universities in one form or another in fiscal year 1968, which is only a few million less than the 1967 total," Smith points out carefully, referring to the substantial amounts of money that NASA will continue to invest in university grants identified with its several operating programs outside Smith's jurisdiction. "With somewhat less money for the University Affairs Program, we will concentrate on developing higher quality. We will reexamine our relationships with all universities in an attempt to identify those programs most viable from the viewpoint of developing multidisciplinary strengths," Smith said. "That is to say, we hope our future programs will yield not only the kinds of physical scientists who can team up with electrical and mechanical engineers to tackle NASA's technical problems, but as well those kinds of social scientists who can help resolve NASA's, and the nation's, increasing management and administrative problems."

Without answering it, Smith posed the general question: Isn't there a growing awareness in all sectors of our economy to the need to train men who might be called "social engineers"—giving them the kind of training that relates to sociology, psychology, economics, as engineering relates to mathematics and physics?

Despite what he calls "this pause to reevaluate the university program," Smith makes a persuasive case in support of NASA's dedication to its university partnership. He calls attention to the fact that before the recent (March) realignment of NASA functions, what used to

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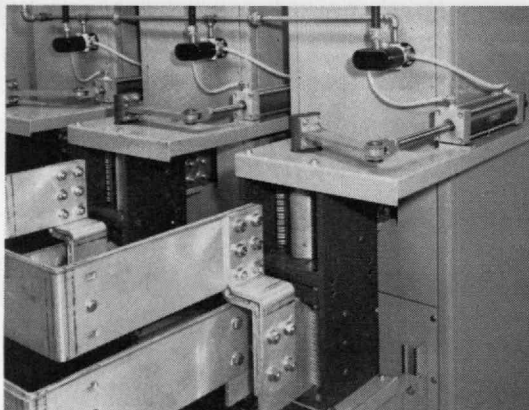
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be the Office of Grants and Research Contracts under Thomas L. K. Smull, was several steps removed from NASA's administrator, James E. Webb. The OGRC was located down the line under an operating unit, the Office of Space and Applications under Homer Newell. Now, the new Office of University Affairs, OGRC's successor, is where Mr. Webb wants it—in the Office of Organization and Management under Harold Finger, just two administrative steps away from James Webb.

Men who keep the President informed about Federal administration of science programs carried forward in the nation's colleges and universities advise that there never was a time when Mr. Webb was not aware of his responsibility to avoid turning out too many single-tracked, space-oriented Ph.D's whose usefulness to the nation would end with Apollo. Mr. Webb, they report, never viewed the goal of 1,000 Ph.D's per year by 1970 as exclusively NASA men, but as USA men, inner- as well as outer-space scientists and engineers, capable of serving the U.S. in many capacities. These observers will tell you that the nation was fortunate that it had a man like James Webb who viewed the scientist-production enterprise with horizontal, rather than vertical, concepts.

NASA's university affairs problems are peculiar to NASA—they are not reflected in any other university-related program of other Federal agencies. In fact, the total amount of money for science and engineering sustenance for colleges and universities will increase, slightly, during fiscal year 1968 if the Congress approves proposed budgets, or any reasonable part thereof. The curve will rise less precipitously, but the funds will be directed increasingly toward projects designed to bring surcease to the nation's social sorrows.—Clyde C. Hall. □

Air Pollution: Enter the Lawyer

The first technologists involved with air pollution problems were the combustion engineers, who half-a-century and more ago were called in to reduce the smoke generated by burning soft coal. Next came the chemical engineers, called in to modify industrial processes and reduce the toxic wastes being discharged into the air.

In the next decade, says Melvin W. First, '36, Associate Professor of Applied Industrial Hygiene at the Harvard School of Public Health, "the air pollution control expert will be the lawyer."

For air pollution, Dr. First told an M.I.T. seminar this spring, is now entering the era of regulation. We have recognized the dimensions and gravity of the problem and are in the process of establishing clean air standards. Our need now is to measure accurately and effectively, to evaluate correctly, and to impose corrective measures fairly among all the sources and potential sources of dirt in the air.

The basic control mechanism, said Dr. First, must be enforceable air quality standards. Emission controls—to limit the total emissions from any one source—enacted in conjunction with these result in weakness rather than strength, for they leave unanswerable the

question of what to do when air quality is poor but there are no individual emission control offenders. □

Mariner to Venus

Four Mariner spacecraft were built at the Jet Propulsion Laboratory of California Institute of Technology early in this decade for a mission to photograph Mars. One of them was a test vehicle; one failed to achieve the proper trajectory because of a nose fairing failure; and the third completed the Mars mission in 1965.

The fourth has now been modified for a mission to Venus, and if the launch proceeds according to the schedules in force as this is written it will fly by Venus on October 19, relaying information about the make-up of the atmosphere and—by passing behind the planet as seen from Earth—about the density of whatever atmosphere may surround the planet.

Some details of how these four spacecraft were designed and built were told late this spring to members of the M.I.T. student section of the American Society of Mechanical Engineers by Jay D. Schmucker, '57, a member of the structural design team at Jet Propulsion Laboratory. Here are some of the not-so-small side-lights with which he intrigued his student audience:

- A fully equipped Mariner spacecraft weighs just under 600 pounds. But the basic structural items on which all the experimental and operating equipment hangs weighs only 34 pounds.

- Weight reduction was one of the main design parameters, and weights of structural members and other components were reduced to a remarkable minimum. The structure to which the solar cells are attached, for example, is so thin that it is severely damaged if a pencil is dropped on it.

- In addition to meeting this remarkable weight requirement, the structure must be designed to survive launch and ground handling activities, including environmental testing. One constraint was that it must fold to fit inside a large van for transportation from California to Cape Kennedy.

- Two factors tend to cause Mariner instability during flight: the pressure of light from the sun on the solar cells, and leakage from the gas jets of the craft's orientation system. Even reduced to a minimum, the gas leakage turned out to be at least as important as the pressure of light.

- The Mariner's attitude in space is maintained by sensors which sight on the sun and the star Canopus, and the Canopus sensor presented special problems. Tests were needed at every stage of construction to make sure that no part of the spacecraft could reflect spots of light which the Canopus sensor might confuse with its parent star. And the spacecraft must be kept clean: in direct sunlight in space, a particle of dust 1/10,000th inch in diameter six feet from the spacecraft is as bright as Canopus. □

Five-Year Engineering Courses

Engineering education has before it a recommendation to make most engineering curricula require five instead of four years, but the applause has been rather less than deafening.

The recommendation is contained in an interim report, the next-to-final version of a four-year study of the American Society for Engineering Education. It is

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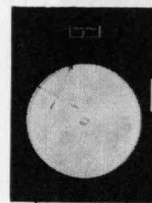
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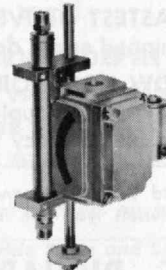
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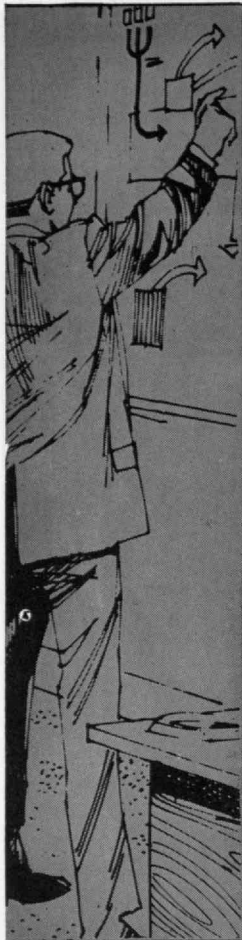


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based on the increasing complexity of modern engineering assignments; a poll of working engineers conducted by the study group showed that 99 per cent of master's degree holders and 98 per cent of doctorates answered "yes" to the question, "If you had your education to do over again, would you go on to graduate work?"

Surveys of engineering education occur about once a decade, says *The Chronicle of Higher Education*, and "the studies have usually accurately predicted the future." But there is lots of opposition to the idea of nearly-universal graduate work for engineers among the professional societies which are represented on the engineering accrediting body, Engineers' Council for Professional Development. Among their reasons is the fear that the five-year requirement might "downgrade" working engineers who hold only bachelor's degrees. □

Relating Unrelated Business Income

The Internal Revenue Service has proposed important new changes in the regulations under which the "unrelated business income" of tax-exempt institutions is subject to taxation. If adopted, the proposals will have far-reaching effects on some of the activities of universities and professional societies. Campus radio stations, for instance, would pay tax on the income from advertising; so would college publications such as *Technology Review*. Profits from the sale in college stores of goods not related to educational programs might be taxable, and so might the profits on athletic activities and dormitories and dining halls.

The fundamental purpose of the new regulations, in their own words, is "to place the business activities of exempt organizations upon the same tax basis as commercial endeavors with which they compete." John Holt Myers, a Washington tax consultant to many universities and nonprofit organizations, believes that Congress in enacting the income tax laws intended to be somewhat more forgiving; income taxes were to be imposed upon "activities of a business nature . . . unrelated to the purpose for which the institution was granted its exemption."

The Internal Revenue's new interpretation could have significant effects on a number of college, university and society activities.

The wording of the IRS statement suggests that the new regulations are aimed especially at the publishing activities of such institutions as the National Geographic Society, the U.S. Chamber of Commerce, and the American Medical Association, which realize "substantial income" from advertising. The tax-free status of their highly profitable and widely circulated publications has attracted commercial publishers' ire for a number of years, and the new IRS proposals were greeted warmly in at least one journal: *Industrial Research*, citing the recent influx of commercial publications of quality "equal to or better than" that of professional society publications, says, "It is an intolerable business condition that permits 'nonprofit' publications to charge less and earn more than 'profit-making' periodicals because of tax and postal subsidies."

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But professional societies see the new IRS proposals as a substantial threat to their ability to communicate effectively with widespread memberships. In *Chemical and Engineering News*, Richard L. Kenyon, Director of American Chemical Society publications, recalls that the ACS is "a scientific and educational institution." Work toward these objectives he said, "has long and properly stood tax-free," and advertising income from its journals has been a significant source of support. Many alumni magazines, too, depend upon advertising income to help make possible effective publications without great depletion of institutional resources.

Whether such situations were in mind when IRS said it would consider advocating legislation "to make the unrelated business income tax inapplicable to organizations having only small amounts of unrelated business income" remains to be seen. □

On Preserving "Inspired and Rebellious Creativity"

As the technology of buildings becomes increasingly complex, is the creative individual designer doomed to submerge his skill in a group effort in which he is outweighed by technologists and craftsmen?

This dilemma has faced architects through the ages, Lawrence B. Anderson, '30, Dean of the M.I.T. School of Architecture and Planning, told members of the M.I.T. Alumni Council this spring. Admittedly, today's pressures are greater. Between now and the year 2000, we shall have to build as much as has been built in all history, Dean Anderson said; this is environmental development at a scale which will never make possible the vast individual works of art which are part of today's architectural inheritance. "Whatever kind of architect one turns out to be today, there is the absolute necessity of swimming in more information than one person can encompass. Environmental design has necessarily become a multidisciplinary activity."

Through all this proliferation of professional involvement, designers must maintain their skill and independence. And they will do so: "The inspired and often rebellious creativity of individual man is not about to be snuffed out."

In his *Notes on the Synthesis of Form*, Dean Anderson says, Christopher Alexander may point to the solution; he "makes one of the first significant attempts to set up a logical structure for the process of design . . . to invent formal and impersonal thinking tools, a new language, as it were, that can cope with the complexities of contemporary building programs."

The social process may not necessarily eradicate the individual and his intuition, after all. □

Professionalism for Massachusetts

A state-wide campaign to modernize professional civil service in Massachusetts was launched late in April by Francis W. Sargent, '39, the Lieutenant Governor of Massachusetts, at the annual meeting of the Massachusetts Section of the American Society of Civil Engineers at the M.I.T. Faculty Club.

"A wholly unrealistic system" of requirements and preferences now makes it impossible for Massachusetts to recruit professional talent, Mr. Sargent said. In the past 20 years the state's Department of Public Works has succeeded in recruiting to its staff only 15 profes-

sional engineers, and the imminent retirement of many of its long-time professionals threatens the agency's effectiveness, he said.

The problems, according to Mr. Sargent, are the poor reputation of public service in Massachusetts, the inadequate starting salaries, "absurd" residence requirements, the state's absolute veterans' preference laws, and the lack of academic requirements for professional assignments.

A bi-partisan commission appointed by Massachusetts' Governor John A. Volpe made important recommendations which will "lift state professional assignments out of their present mediocrity," and the promotion of this report is Mr. Sargent's principal present assignment, he told the ASCE members. He needs help, he said, from every professional engineer in the state. □

The Future of Progress

The growing complexity of modern life is a constant theme, but do we really understand the problems and challenges of modern man?

Our progress in science is very great, and the strides of modern technology are "stupendous," said Dr. Julius A. Stratton, '23, President Emeritus of M.I.T. who is now chairman of the Ford Foundation, in the 1967 Charles M. Schwab Memorial Lecture to the American Iron and Steel Institute.

But social progress is a very different thing. For we are confronted in today's civilization with "the confluence of many streams of economic, political, and engineering development into a single, massive, immensely complex

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Trend of Affairs

assembly."

If we are to apply the fruits of science and technology for the larger benefit of society," said Dr. Stratton, "then we must all begin to think more clearly about a national ethic—about the balance of individual freedom to do as one likes against the essential needs of an ordered society; about the cost and consequences of poverty and need; about the preservation of our physical environment and our natural resources; about the kind of world we want to achieve."

These issues begin to demonstrate that modern men must think of society in a systems sense and must focus on modern issues from every point of view and with every available resource in the light of the total social system. This goal, warned Dr. Stratton, "will not happen of itself. It will come about only by greater clarity of purpose, by a more common agreement on what constitutes better and what constitutes worse."

Modern problems, increasingly complex, often cut across the lines of public and private interest; government, universities, and especially industry must join in their study and resolution. "If now we are to preserve the concept of free enterprise, the private sector," said Dr. Stratton, "must enter on a widening scale into a whole new domain of activities. A failure to do so can only lead inescapably to the intervention and control of a central authority." □

The New Skills of the Bioengineer

The failure of medical and instrumentation specialists to work effectively together in interdisciplinary teams to develop new medical methods is leading to two significant developments for the engineering profession:

- Much research and development work of medical and biological interest is now taking place in such traditional engineering fields as mechanical, electrical and chemical engineering and analytical chemistry.
- A new profession of bioengineering is now developing from the skills of the medical and engineering sciences combined in interdisciplinary programs of teaching and research.

The goal, says Kurt S. Lion, Associate Professor of Biology at M.I.T., in a paper to be published this summer in the *Proceedings of the Oak Ridge Conference on Engineering Science in Biology*, is to teach basic physical concepts, instrumental methods, and basic biological and medical knowledge so that a research worker is able "to translate a biological concept into a physical concept that can be measured with instruments."

"In the final analysis," says Professor Lion, "our instruments must measure physical quantities from which the biological events are derived by reasoning or implication."

The trouble with trying to bring medical and engineering scientists together in bioengineering research groups is that they do not understand each other well enough, says Professor Lion. The engineer wins the doctor's respect by trivial new modifications of existing instruments but often finds that a truly challenging instrumentation solution has no real consequence to medicine.

And it is hard for fully trained and productive bio-

logical or medical research workers to find time to learn the physics and engineering they must have to help bridge the gap. Hence Dr. Lion's conclusion to start from scratch with a basic integration of biological and engineering instrumentation skills. □

The Computer's Threat to Privacy

Does the computer revolution threaten Americans' personal privacy?

Sam J. Ervin, Jr., Senator from North Carolina, told the American Management Association's computer conference in New York late last spring that the danger exists—but has not yet been realized and need never be. Man "has it within his power to beat as well as to create the machine," he said.

A "massive" invasion of privacy will be possible, Senator Ervin said, when all the data gradually being accumulated about U.S. citizens in the nation's computers can be correlated—a feat not yet possible. But the time is nearing when interagency and interbusiness networks of computers may make decisions affecting jobs, retirement benefits, credit rating, and security clearance without the benefit of human intervention, without hearing or confrontation of the evidence, Senator Ervin noted.

"One of the most alarming trends I have noted where electronic data processing is used on a large scale," Senator Ervin told the AMA, "is an attempt to transfer responsibility to the computer for mistakes in executive judgment or faulty evaluation of data. This is obviously the most important single factor to be considered in the entire computer movement.

"For a machine has no ethics or morality. If our form of government is to be maintained the morality of decisions based on computer-processed data and the political responsibility for the results of those decisions must be well defined and inescapable. All else flows from this basic premise. The problem is both a philosophical and scientific one, inseparable from the role of science in government." □

Science's Role in Foreign Policy

Just how far do science and technology penetrate into the corridors of power frequented by officials responsible for formulating United States foreign policy? Eugene B. Skolnikoff, '49, Associate Professor of Political Science at M.I.T., attacks this question in a book recently published by the M.I.T. Press, entitled *Science, Technology and American Foreign Policy* (\$8.95).

The impetus for the book came from Dr. Skolnikoff's five years on the staff of the special assistant to the President for science and technology. Between 1958 and 1963 he served under three presidential science advisors—James R. Killian, '26, now Chairman of the M.I.T. Corporation, George B. Kistiakowsky, and Jerome B. Wiesner, now provost of M.I.T.

Dr. Skolnikoff's book is the first to explore the whole range of scientific involvement in foreign policy-making. He emphasizes that science can creep into virtually every aspect of foreign policy-making. In his preface he notes that his five years within the White House structure illustrated that "the role of science in foreign affairs was both more significant and more subtle than was generally appreciated at the time either among scientists or among

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those in the foreign affairs community." Both communities saw the role of science in very narrow terms; scientists tended to concentrate on specific issues, while nonscientists treated scientists as experts to be called in merely to advise on narrowly defined questions. One of the major points that Dr. Skolnikoff makes in his book is that the State Department is not adequately examining scientific considerations in regard to foreign policy. "The ability of the Department of State to meet the technical agencies of government on equal terms when necessary," Dr. Skolnikoff writes, "appears to be declining steadily as the issues with which the department must deal involve increasingly sophisticated scientific and technological elements." □

Megalopolitan Pollution

Cities which contribute to air pollution are also magnets for pollutants already in the air. Glenn R. Hilst, '48, Vice-president of Travellers Research Center, Inc., suspects that this effect may actually impose a limit on the size of the future megalopolis.

A study in Fort Wayne, Indiana—chosen because of its isolation from other urban centers and its lack of geographic discontinuities—suggests that a city's surplus of heat causes enough turbulence to affect significantly the distribution of any pollutants in the air reaching the city. Air carrying pollutants from distant cities is pulled down toward the ground to replace the rising, turbulent heated air, and incoming pollutants are thus concentrated at the city center.

Our predicted future megalopolis, with rows of cities several hundred miles long, each one downwind of the next, may thus be untenable unless elaborate and successful efforts are made to eliminate pollution at every city which may be upwind of any others. If it is not economical to accomplish this much purification, Dr. Hilst told an M.I.T. air pollution seminar this spring, then our future plans for megalopolises may not be economically feasible. □

Diversification for Growth

The increasing diversification of its industry assures that the Greater Boston area is on the threshold of dramatic new technological growth, Albert J. Kelley, '48, Deputy Director of the NASA Electronics Research Center in Cambridge said this spring while dedicating a new regional vocational school in Canton, Mass.

Industries in the Boston area have "created a technological base for broad applications and developed a keen understanding of finance," Dr. Kelley said. As a result, he thinks they will be markedly "less susceptible to the up-and-down cycles of the space and defense programs," better able to maintain a smooth growth.

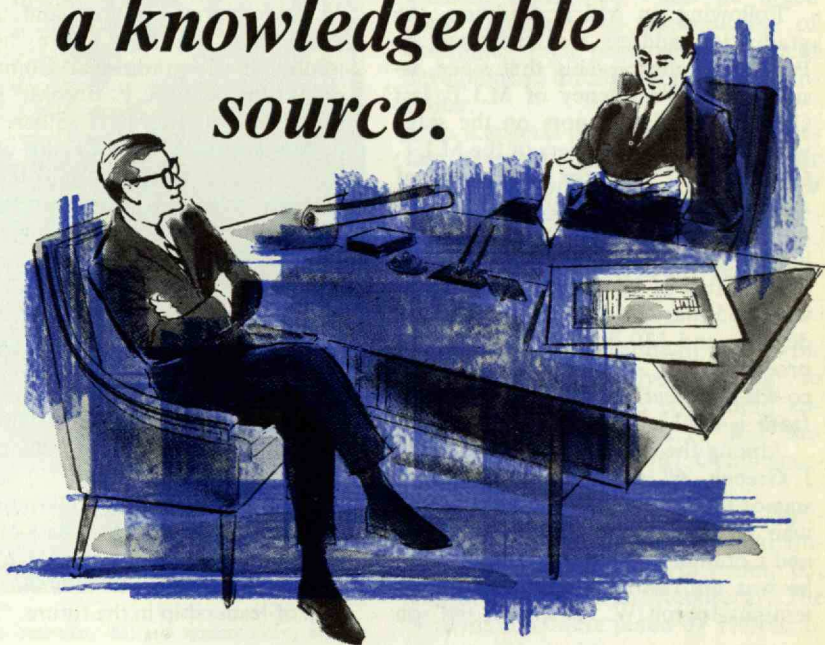
"This is the key to exploiting the technology explosion which has been generating the doubling of knowledge every 10 years," said Dr. Kelley. "And the ability of these firms to manage their growth shrewdly will serve as a catalyst in attracting new and similar types of industries into the area."

Dr. Kelley will become dean of the School of Business Administration at Boston College this summer. ■

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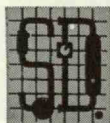


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101st Commencement

The end was just the beginning for 1,241 students at M.I.T. on Friday, June 9, the Institute's 101st Commencement Day.

In all, 1,321 degrees were awarded. Every recipient received his degree from Howard W. Johnson, President of the Institute, on the platform in Rockwell Cage before an audience of more than 3,500 parents and friends. There was music by a brass choir under the direction of John Corley, Assistant Director of Music at M.I.T., and the traditional festivities of a great academic ceremony were relived.

Following an M.I.T. tradition, the graduation address was delivered by President Johnson—his first since assuming the Presidency of M.I.T. last October. Sharing honors on the stage were nearly 100 members of the M.I.T. Class of 1917, back for the first day of a four-day 50th reunion.

Of the degree recipients, 666 were handed bachelor's degrees as members of the Class of 1967; in addition there were 355 master's degrees, 90 engineer degrees, and 130 doctor's degrees. The procession of students included 44 co-eds and nearly 200 foreign students from a total of 47 countries.

Among the new Alumni are Charles J. Greene, '67, son of Lorne Greene, a star of the "Bonanza" television series, who was present for both ceremonies and Commencement Luncheon, where he was the center of considerable attention; Joseph W. Alsop, 2d, the son

of Stewart Alsop, the writer and columnist; Mrs. Hadwig Gofferje Der-touzos, whose husband is a member of the Faculty in Electrical Engineering and who herself is the mother of an eight-week-old daughter; Raymond and Robert Ferrara, twins who have been together throughout their academic careers and who will both enter the Harvard Business School next fall; and Elaine A. Lancaster, who entered M.I.T. in 1966 after two years at Wellesley and organized M.I.T.'s first crew for co-eds (her degree was in mathematics and she will return to M.I.T. as a graduate student in Electrical Engineering next fall, where she will be the first woman to hold the Douglas Aircraft Co. Fellowship).

Following the graduation exercises, M.I.T.'s newest Alumni and the 50-year Class of 1917 were honored jointly at the traditional Commencement Luncheon. E. P. Brooks, '17, former Dean of the M.I.T. Sloan School of Management, spoke for his class. In the industrial world, he told the Class of 1967, you will need more than the blessings of M.I.T.; you will need "qualities of spirit, courage, and willingness to risk" to progress in a world in the grip of bigness. But for 50 years, he said, the Class of 1917 has "had behind us an expanding Alma Mater which enhanced our status as we grew. And M.I.T. will do this for you, too," he told the Class of 1967; "stay close to it."

Responding, B. Gary Garmon, permanent President of the Class of 1967, spoke of his certainty that M.I.T. will find a continuing—if different—position of leadership in the future. "M.I.T.

either makes you or marks you," he said. Despite the "unrelenting" freshman year, we have slowly changed our minds about the Institute, Mr. Garmon told the luncheon audience, and the class now understands that "overcommitment is a virtue."

Boston's fickle spring weather smiled on the graduates throughout the day; early morning clouds kept Rockwell Cage comfortable if not cool, and the sun played light and shadows on the canvas covering the Commencement Luncheon in the Great Court.

Toward Lives of Value

A human's achievement today can be calibrated against three basic criteria: the growth of his intellectual curiosity, his ability to retain a genuine idealism in the midst of a cynical world, and his personal contribution in life. This was the message of President Howard Johnson to graduates of the Class of 1967 at M.I.T.'s 101st commencement.

These criteria are particularly important today, President Johnson said, because this is a time "characterized by a larger scale harvest of potential good and potential evil for mankind, and a potential for massive destructiveness that goes beyond past knowledge and beyond our willingness to believe." As a result, these times characterize "a higher demand for intelligence and for courage, and also a greater opportunity than ever before."

Intellectual curiosity, the first of the three criteria, is the foremost characteristic of a mature, continuous learner. This quality implies more than the technical competence which is M.I.T.'s trademark: competence must be balanced by a diversity of outlook—an ability to view the broad picture of events.

By high ideals, his second area of continuing education, President Johnson explained he meant "an honest belief in freedom, so deep that it permits others to speak their minds and allows other countries to make their own choices. It means a standard to truth so unswerving in our dealings with each other, that it decries the slanting of information by those in authority, as much as it decries the extreme labels in protest parades, and it means a willingness to accept the disagreement that leads to constructive dialogue."

High ideals also mean a commitment to the worth of the human life, so free from national or racial barriers that we can honestly hold it to be the trust of the strong, without fear of suspicion and recrimination. In practice, President Johnson continued, such idealism demands constructive involvement.

This points to the third criterion of the graduate's quality—his contribu-





PHOTOS: OWEN D. FRANKEN, '68, AND ROBERT LYON, M.I.T.



Commencement 1967: Top, left, a faculty combo (John E. Ward, '43, Harold E. Edgerton, '27, Theodore Woods, Jr., Truman S. Gray, '29, and Jon R. Kelly, '61) at the Graduation Eve Party . . . the head table for the Commencement Luncheon (Mrs. John W. Hafstrom ('65), Harold L. Hazen, '24, Mrs. Kenneth R. Wadleigh ('43), Julius A. Stratton, '23, Mrs. Theodore A. Mangelsdorf ('26), Edward P. Brooks, '17, Mrs. Howard W. Johnson, and James R. Killian, Jr., '26) . . . President Howard W. Johnson passing out diplomas and congratulations . . . Leslie R. Groves, '17, and Vannevar Bush reminiscing on busy World War II days among the guests of honor.

tion—to others, to his family, to the economy, and to the country. By contrast with the two extreme attitudes of their last decade and the present one—respectively the concept of the organization man and the person who opts out of society—the attitude of contribution means the acceptance of responsibility, and creativity in the face of difficulty.

In concluding, President Johnson stressed the concept of a life of value: "Let us seek now to relate the new ideas, meanings, and hopes to the problems of our society and let us provide a solid base for the important self-education of our able new generation. It is clear to me that in the end, this Institute will be known by its graduates. We wish for each of you 'lives of value.'"

R.O.T.C. Commissioning

Fifteen members of the M.I.T. Class of 1967 received commissions in the U.S. military reserves at M.I.T. exercises on June 8, and eight more were cited to be commissioned upon completion of minor requirements.

The simple exercises in Kresge Auditorium opened the Commencement Weekend festivities in Cambridge. As principal speaker, Colonel Remi O. Renier, New England Division Engineer, assured the new officers that they would find their military careers a "rewarding experience," and he urged them to accept the responsibility of continuing their personal growth and development through continuing education.

In a special message of congratulation, General John P. McConnell, Air Force Chief of Staff, spoke to the new officers of the responsibilities and record of R.O.T.C. graduates in the service of the nation over many years past.

Goodwin Medals

The award of two Goodwin Medals for "conspicuously effective teaching" to two Alumni who are continuing advanced studies at M.I.T. was announced during the 1967 Commencement Exercises.

The winners were Walter H. Berninger, '63, Instructor in Electrical Engineering, and John W. Hafstrom, '65, Teaching Assistant in Metallurgy. The presentations were made by Harold L. Hazen, '24, in his last appearance at an M.I.T. Commencement before retiring as Dean of the Graduate School.

The Goodwin Medal, established by his family in memory of Harry Manley Goodwin, the first Dean of the M.I.T. Graduate School, honors graduate students with outstanding teaching abilities. The award includes both the medal and a \$500 cash prize.

Mr. Berninger began as a teaching assistant before he received his bache-

lor's degree, and a faculty colleague has said, "It was obvious, even at that time, that he was an outstanding teacher." He has taught five electrical engineering subjects during the past four years, and recently he has been concerned with a survey introduction to electrical science for students in other fields.

The Structures and Properties of Materials, an undergraduate introductory course, has been Mr. Hafstrom's special responsibility. In his nomination, Mr. Hafstrom's students stressed his careful preparation and constructive notations on papers and quizzes; under him, one student wrote, "the purpose of the class is learning rather than making the grade."

Corporation Members

At their breakfast meeting preceding the 1967 graduation exercises, members of the M.I.T. Corporation elected three new life members and five new term members.

The new life members are:

- Robert B. Semple, '32, President of Wyandotte Chemicals Corp., who was an alumni term member of the Corporation from 1961 to 1966.
- Luis A. Ferre, '24, partner in Ferre Industries of Puerto Rico, a special term member of the Corporation since 1962.
- Semon E. Knudsen, '36, Executive Vice-president of General Motors Corporation, an alumni term member of the Corporation from 1960 to 1965.

The new term members, each holding five-year appointments, are:

- George P. Edmonds, '26, Honorary Chairman of the Board of Wilmington Trust Co., a special term member of the Corporation from 1960 to 1965.
- H. I. Romnes, Chairman of the Board of American Telephone and Telegraph Co., a graduate (1928) of the University of Wisconsin who has been associated with Bell System companies throughout his business career.
- Donald A. Holden, '31, President and Chairman of the Board of Newport News Shipbuilding and Dry Dock Co. which he first joined in 1934 upon receiving his master's degree in general engineering from M.I.T.
- Albert H. Bowker, '41, Chancellor of the City University of New York, who taught mathematics at M.I.T., Columbia, and Stanford Universities before joining C.U.N.Y. in 1953.
- Ralph F. Gow, '25, Vice-chairman of the Board of Norton Co., with which he has been affiliated since graduating from M.I.T. in business and engineering administration.

In addition, Gregory Smith, '30, who is President of the M.I.T. Alumni Association for 1967-1968, will serve ex-officio on the M.I.T. Corporation during the year.

Alumni Day 1967

Lt. Col. Edwin E. Aldrin, Jr.'s ('63) was the first slide rule in space, and when his Gemini-12 spacecraft experienced radar trouble that slide rule helped its crew achieve the scheduled rendezvous with the mission's Agena target vehicle.

Lt. Col. Aldrin shared spotlights at the 1967 Alumni Day in Cambridge with three seminars on current management problems and with a day-long co-ordinated seminar-and-panel presentation on technological resources and the world's population explosion. In all, more than 1,200 graduates from 1896 to 1967 registered for the day's events.

The technological resources and population explosion seminars were led by J. Herbert Hollomon, '40, Acting Under Secretary of Commerce who will soon become President-Designate of the University of Oklahoma (on the management of growing business and government); Gordon S. Brown, '31, Dean of the M.I.T. School of Engineering (on restructuring technological education); Donald G. Marquis, Professor of Organizational Psychology and Management (on the application of new technological knowledge); and Nathaniel H. Frank, '23, Professor of Physics (on restructuring vocational education). After the annual luncheon, these four seminar leaders joined for a panel discussion moderated by Jerome B. Wiesner, M.I.T. Provost.

Meanwhile, three management seminars were convened by members of the Sloan School of Management: Professors Douglass V. Brown and Abraham J. Siegel on future developments in manpower and industrial relations; Professor Stewart C. Myers on stock prices and corporate financial policies; and Professors Robert C. Casselman, '39, and Arnold E. Amstutz, '58, on the systems approach to marketing.

Colonel Aldrin's description of the Gemini 12 flight came at the end of the afternoon—a "surprise" dividend for the busy day. Earlier, he and M.I.T. President Howard W. Johnson had been made honorary members of the Class of 1917—Colonel Aldrin's father's class—which had just finished its 50th reunion at the Chatham Bars Inn on Cape Cod. Frank P. Omohundro, '49, of Woods Hole Oceanographic Institution, another late-afternoon "special" speaker, described the use of W.H.O.I.'s deep submergence vehicle "Alvin" to recover the hydrogen bomb



Receiving and giving on Alumni Day: Honorary membership in the Alumni Association from Theodore A. Mangelsdorf, '26, to Mrs. Evelyn B. Yates, Alumni Placement Officer . . . a gavel to Gregory Smith, '30, next year's Alumni President . . . a cardinal coat to President Howard W. Johnson from John A. Lunn, '17, signifying honorary membership in the class . . . and a model of Gemini 12 to M.I.T. from spaceman Edwin E. Aldrin, '63.



J. Herbert Holloman, '40, the "top man" at a series of Alumni Day seminars, said that despite the population explosion mankind is finally ready to face the hardest problems—the questions which affect the quality, not the existence, of life.

lost in a mid-air collision over the coast of Spain six months ago; he emphasized the safety and maneuverability features which made "Alvin" a unique resource for this difficult recovery assignment.

The good weather which favored commencement and the reunions on Friday and the week-end continued for Alumni Day on June 12. Hot, humid air of the morning retreated before Boston's famous East wind during the luncheon hour in the Great Court and a late-afternoon thunderstorm added a touch of drama to the champagne social hour in the new Student Center. (Because the Student Center is primarily an undergraduate building, its rules, adopted by M.I.T. student government, permit serving only wine and champagne.)

The evening entertainment in Kresge Auditorium developed into a sing-along with Your Father's Mustache Banjo Band; the chorus of the Lincoln-Sudbury Regional High School and a troupe of Mariachi folk musicians from Mexico were popular added attractions. Later, for the hardy survivors there was dancing in the Student Center until after midnight.

No one will remember the 1967 Alumni Day as a riot of college capers, but 1,200 Alumni found it a warm renewal of their association with M.I.T., their classmates, and their professional education.

Human Resources

How can mankind stretch its intellectual resources to meet truly the needs of its multiplying species?

This was the question for the all-day seminars-and-panel series on Alumni Day at M.I.T. on June 12; but nobody left the campus certain that he knew the answer.

The guest star of the day was J. Herbert Holloman, '40, Acting Under Secretary of Commerce who is due to become President-elect of the University of Oklahoma this fall. Ours, he said, is the first society that can really ask the question. For the first time, he said, a human culture has been able to concern itself with the quality of life rather than simply its basic necessities of food and shelter.

Hence, said Dr. Holloman, Western man spends much of his income on public goods—such as education, roads, and medical systems—rather than private goods (see *Technology Review* for May, 1967). And our real problem today, and tomorrow, is to organize methods for supplying public goods adequately. This is no easy task, he said: such problems as rehabilitating Harlem are extremely complex to manage, in contrast with technical problems such as the nation's space pro-

gram for which the objectives are relatively easy to specify.

In view of the enormity of the public problems, Dr. Holloman suggested, we must look again at the possibility of having private enterprise operate in the public arena. While technological change to satisfy private demand is primarily the prerogative and responsibility of private industry, Federal initiative is appropriate to take the powerful scientific and engineering techniques now available and focus them on many large and complex economic problems, Dr. Holloman concluded.

Nathaniel Frank, '23, Professor of Physics at M.I.T., discussed vocational education, in the context of the increasing number of students who go directly from public schools into jobs. One of the major problems confronting educators, said Dr. Frank, is the task of smoothing the transition between school and work, so that non-college students are both well educated for roles in society and well trained for useful employment. Dr. Frank suggested that such tasks were beyond the competence of the schools. Instead, he felt that they should be undertaken by separate institutions which would have to provide a multiplicity of career preparation programs, available to a broad spectrum of people from those of limited capability to those of great talent and for an age range from the early school dropout to adults in need of training.

The need to restructure technological education at the college level formed the thesis of Gordon S. Brown, '31, Dean of M.I.T.'s School of Engineering. Man has never, said Dean Brown, invented anything which he has not soon asked to do more than its original task. Man's aspirations continue to increase, and so engineers' problems are especially difficult and challenging. The universities must help them to fulfill these professional demands by providing effective and comprehensive engineering education. And today, said Dean Brown, this means that universities must find the way for their faculties and students "to engage in multidisciplinary projects which have relevance to modern problems."

The fourth speaker, Donald G. Marquis, Professor of Management at M.I.T., spoke on techniques for reducing the time lag between scientific discovery and its application to the problems of the real world.

The afternoon's panel session finally settled down to a debate on the kind of education necessary for engineers, particularly in developing countries, and the values of a large body of graduates in such countries compared with a reservoir of less able, but possibly more practical talent. Dr. Holloman

went as far as to suggest that engineers might wait until they became postgraduates before studying real engineering; their undergraduate days could be spent on pre-engineering training, analogous to pre-medical training. Dean Brown's reaction was less than enthusiastic.

M.I.T. and the Future

The creative contributions of M.I.T. must now be broadened so that the Institute can "relate the ideas and hopes of a new technology to the needs of a demanding new world," Howard W. Johnson, President of M.I.T., told 1,200 Alumni and their families at the annual Alumni Day luncheon in Cambridge on June 12.

"A creative M.I.T. will continue to fuel men and women early in their lives and sustain them until their days are finally counted," he said. But in addition the Institute now has the opportunity to bring its powers to bear on world problems "more complex and more demanding of technology" than ever before.

To fulfill its obligations to M.I.T. undergraduates, President Johnson said, "the challenge before us in the next few years is to build the right environment, especially living and housing conditions, for effective education. Already, he said citing McCormick Hall and plans for a new men's dormitory, a "major student housing program is under way." We must also increase the "diversity of educational experience for our students," he said, and he referred to new plans for cross-registration privileges for M.I.T. and Wellesley students as a significant experiment in this direction.

M.I.T. continues to take pride in the "quality and the continuous accomplishment of our teachers," said President Johnson. "It is this distinguished faculty that bears the burden of providing an education for the national resource that makes up our student body. And it is in the final analysis their personal interest, their concern for continuous learning and their own mature accomplishments in research that will measure the success of this task."

And the Institute emphasizes, too, continuous revitalization of its ongoing work, President Johnson said, "an unrelenting and urgent exploration of new fields affecting man's well-being." The fact that students and faculty together progress constantly on to new objectives is the "best assurance that M.I.T. will retain its central mission."

Taken together, M.I.T.'s principles, declared President Johnson,—"a con-

cern for continuous learning, a pressing forward to pioneer new fields, a willingness to take responsibility for large affairs, a dedication to teaching — . . . produce a total system of values that should serve to give us strength for the present and higher expectations for the future at a time when there are basic tests ahead for the private university system.

"Can anyone doubt that the stream of technology still is the strongest hope to effective development of goals of the human spirit, and that what happens at M.I.T. will affect that future?"

Space Mechanic

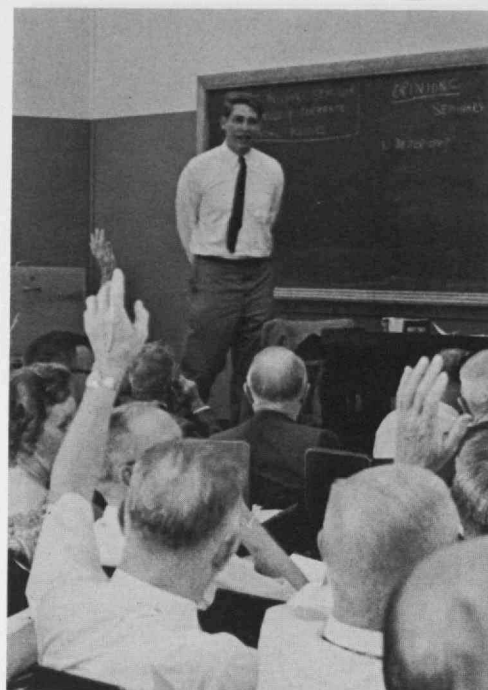
A surprise package on Alumni Day was the appearance of Lt. Col. Edwin E. (Buzz) Aldrin, Jr., '63, who narrated the NASA film of the flight of Gemini 12, in which he participated as pilot and spacewalker.

Buzz Aldrin, accompanied by his father, Edwin E. Aldrin, '17, appeared resplendent in the red blazer of an honorary member of the reuniting class of '17, an honor he had received at luncheon. He remarked that, in addition to becoming the first space mechanic (by virtue of wielding a wrench as one of his work tasks) he was also the first astronaut to take a slide rule into space.

Colonel Aldrin noted briefly the achievements of the Gemini series. It had, he said, accomplished its objectives.

He then addressed himself to the schedule for the Apollo program. This year, he said, will see three unmanned flights to test out the Apollo module's heat shield and the hydrogen venting system in the second stage. NASA also hopes late this summer to launch the first Saturn V rocket, the vehicle which will loft the moon-bound manned flight. Other unmanned launches will follow, testing various Apollo components, and leading up to the first manned Apollo flight, possibly to take place in March of next year.

Colonel Aldrin also referred to the Apollo Applications program, which will aim to discover more about the space environment from near earth orbit. He mentioned three specific sets of experiments in the program: a series of scientific experiments will aim to explore the space environment near earth; a scientific workshop will be set up on board one of two craft in a dual launch, to give astronauts sufficient tasks to fill a 28-day mission; and an "Apollo telescope mount" will be joined to a command and service module to provide an astronomical laboratory which can rendezvous with a workshop for a program of solar observations lasting up to 56 days. Obviously there will be no shortage of work in the years to come for space mechanics.





Alumni Day highlights: a forest of hands greeting Stewart C. Myers, Assistant Professor of Finance, in his management seminar . . . President Howard W. Johnson and Jerome B. Wiesner, Provost, with John W. Kilduff, '18, and Whitworth Ferguson, '22, at the social hour . . . Edwin E. Aldrin—father '17 and son '63—with John A. Lunn, '17, Class President (center) . . . the Class of 1917's honor guard (Leslie R. Groves, A. Raymond Brooks, and the Aldrins) bringing Raymond Stevens, reunion gift chairman, to the luncheon rostrum . . . M.I.T.'s four first ladies together after the luncheon: Mrs. Karl T. Compton, Mrs. James R. Killian, Jr. ('26), Mrs. Julius A. Stratton ('23), and Mrs. Howard W. Johnson . . . the 55-year Class of 1912 at luncheon . . . and a campus view as the social hour approached.

Fund, Reunion Giving

Philip H. Peters, '37, Chairman of the Alumni Fund Board, reported record giving to the 1967 Alumni Fund of \$1,915,476 from 16,492 Alumni as of Alumni Day. With three weeks of the Fund year still to go, the number of Alumni Fund participants had exceeded any previous year and it seemed inevitable that last year's record total of gifts will be exceeded.

Speaking for his Class of 1942, George J. Schwartz presented a reunion gift of \$200,200, the contributions of 407 members of the class.

The 40-year Class of 1927 presented a gift of \$421,300 from 361 members, reported gift chairman Harold W. Fisher.

The gifts presented by the 50-year Class of 1917 included \$820,236 in cash and \$2,410,450 in deferred gifts earmarked for M.I.T. in the future, reported Raymond Stevens, reunion gift chairman.

Honorary Members

The rare privilege of honorary membership in the Alumni Association of M.I.T. came to two women, whose service to students and Alumni spans nearly 30 years, during the 1967 Alumni Day luncheon. The two are:

- Mrs. Eleanor S. Lutz, Selective Service Adviser to undergraduate students.
- Mrs. Evelyn B. Yates, Alumni Placement Officer in charge of the unique service to bring together M.I.T. Alumni and potential employers.

Mrs. Lutz came to M.I.T. in 1938 as secretary to John J. Rowlands, Director of the M.I.T. News Service; she assisted Mr. Rowlands during World War II when he was given the responsibility of advising students regarding military service. Later the selective service adviser was established and Mrs. Lutz placed in charge.

During her 25 years in alumni placement work, Mrs. Yates has placed more than 4,000 former students in jobs. She came to M.I.T. in 1942 from a similar post at Wellesley College, from which she was graduated in 1930.

Alumni Fund Board

Eight new members have joined the Alumni Fund Board upon their appointment by the Executive Committee of the Alumni Association, and the Board has chosen from among its members Howard L. Richardson, '31, to be chairman for the 1967-1968 Fund.

The new members of the Board include Philip L. Coleman, '23; Sterling H. Ivison, Jr., '41; Dean L. Jacoby, '54; Samuel E. Lunden, '21; Denman K. McNear, '48; Thomas F. Morrow, '35; Carl M. Mueller, '41; and Leonard F. Newton, '49.

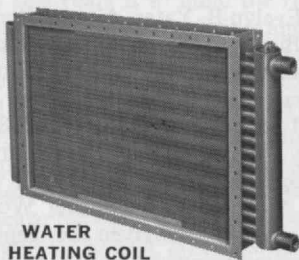


B. E. JAMES '32, President

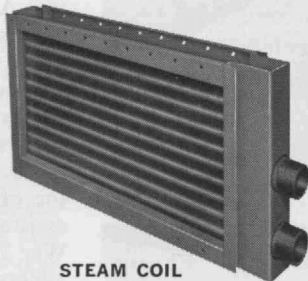
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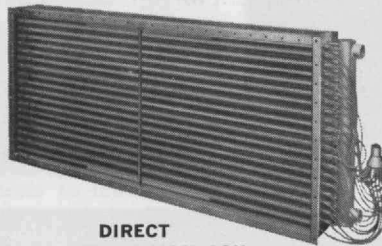
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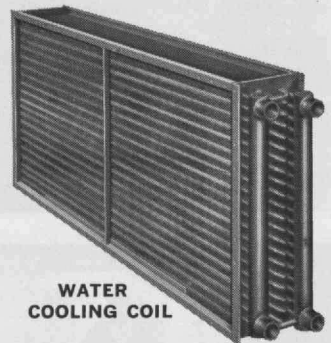
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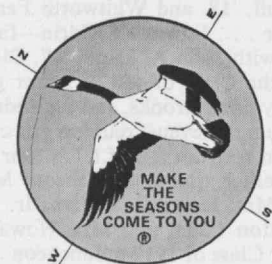
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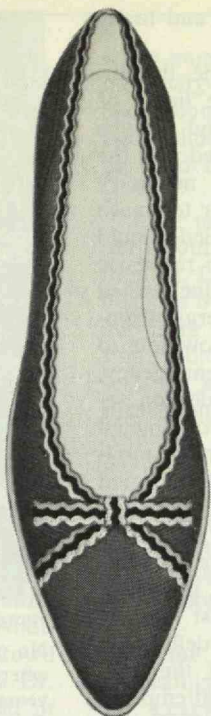
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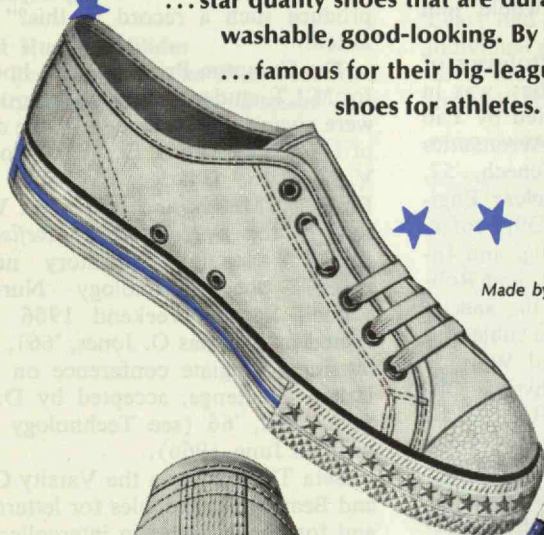
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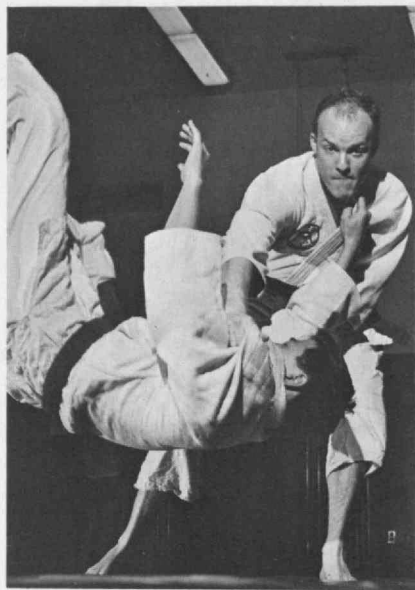


PHOTO: HARRY K. OTAGURO, '67, © AM. CHEM. SOC.

Peter A. James, '67, top man in this year's class of 36 M.I.T. chemical engineers, won a 1967 Chemical and Engineering News National Award of Merit for successful combination of scholastic and extracurricular achievement. He helped introduce judo as a sport at M.I.T., is president of the Judo Club, was chairman of the Judicial Committee and student captain of the Baker House dining service.

An Institute Gazette

Mission to Icarus

Next June, Icarus, a boulder about a mile in diameter which is probably an asteroid, will pass within four million miles of the earth—a minute distance in astronomical terms. Just suppose that Icarus were to change its course very slightly, and move onto a collision course with the earth: what could the world do to prevent a literally earth-shaking collision?

This was the question put to 21 students in the spring semester's Advanced Space Systems Engineering project. In previous semesters, students in this field have designed satellites, manned space probes, and rescued astronauts (see *Technology Review*, January, 1967, page 42).

At the outset of their project in March, the students were told that they could commandeer any available hardware in the United States in view of the urgency of stopping the rogue asteroid. Further, they learned that Icarus would collide with the earth at 12.26 (GMT) on June 19th, 1968, in the mid-Atlantic, about 2,000 miles east of Florida. If they failed to prevent it, the 500,000 megaton impact would give rise to tidal waves which would cover Florida with water and

destroy New York, Boston and many other Atlantic Harbors.

To prevent this catastrophe, the students decided to go to the limits of present-day technology—and maybe slightly beyond. They decided that the minimum power of bombs necessary to drive Icarus off course, or to smash it to smithereens if that failed, would be 100 megatons. While no reference to such bombs exists in the unclassified literature, the Atomic Energy Commission should have the know-how to produce them for such an emergency.

The bombs would be loaded on vehicles consisting of a nose cone mated to an Apollo cylindrical service module. The vehicles would be boosted into free fall courses by Saturn-V moon rockets.

The group decided to have six shots at Icarus before sitting back and waiting for the disaster. The first four, at high altitude, would aim to deflect the asteroid from its course; if these all failed, the last two would attempt to blow Icarus into pieces small enough to burn up in the earth's atmosphere.

The bomb-loaded vehicles would find their target automatically; receivers on board would pick up radar pulses from Lincoln Laboratory's Haystack transmitter bounced off the surface of Icarus. And if the later vehicles had to chase large fragments of Icarus over the sky, worldwide space communications facilities would join in the act.

Paul E. Sanderoff, '39, Professor of Aeronautics and Astronautics, was in charge of the project, assisted by Yao T. Li, '38, Professor of Aeronautics and Astronautics, Henri Fenech, '57, Associate Professor of Nuclear Engineering, Louis D. Smullin, '39, Professor of Electrical Engineering, and Instructors John J. Deyst, '58, and Robert G. Stern. And among the special lecturers who introduced the subject to the students were Dr. Fred Whipple of the Smithsonian Astrophysical Observatory, Dr. Samuel Herrick of UCLA, Dr. Jack Funk of NASA's Manned Spacecraft Center, and Drs. Herbert G. Weiss, '40, and Charles E. Muehe, '52, of Lincoln Laboratory.

Honors Convocation

For "losing their identity in enterprises greater than themselves," as Mrs. Karl T. Compton put it, more than 50 M.I.T. students and Alumni were cited at the annual Honors Convocation this spring.

Mrs. Compton, who was there to award the Compton Prizes provided by a fund of the Boston Stein Club, told the students that "the search for identity may not be easy in our mass culture. But who wants it easy? Who can



PHOTO: ROBERT LYON FROM TECH TALK

No one knows where he comes from or where he goes. But for the past several years this raccoon has arrived in the Great Court to snooze in a tree outside the office of Philip A. Stoddard, '40, Vice-President—Operations and Personnel, for a few days before resuming the mysterious trip to his summer home. This year Mr. Stoddard thoughtfully called Tech Talk's photographer, to whom the Review is also grateful.

say that our society is decadent when at M.I.T. individuals and groups can produce such a record as this?" she asked.

The Compton Prizes, highest honors for M.I.T. students and student groups, were given to five members of the class of 1967—Stephen B. Douglass, Robert V. Ferrara, Charles E. Kolb, Jr., Frank A. March, and Jeffrey M. Wiesen; to the *Burton House Reflector* (M.I.T.'s leading dormitory newspaper), the Technology Nursery School, Spring Weekend 1966 (accepted by Thomas O. Jones, '66), and the intercollegiate conference on The Urban Challenge, accepted by David S. Mundel, '66 (see *Technology Review* for June, 1966).

Beta Theta Pi won the Varsity Club and Beaver Key trophies for lettermen and for participation in intercollegiate athletics.

A new award, named in honor of the late James N. Murphy, was announced at the Convocation: it will be given from time to time to an Institute employee "for outstanding service to the community and with special regard to contributions to students. The award, said Robert J. Holden, Associate Dean of Student Affairs, recognizes Mr. Murphy's "superb contributions to the Institute family throughout nearly 40 years," culminating in his service as manager of Kresge Auditorium and later the Student Center.

Kingdom of Heaven or Tool of Devil?

The Tech reports a unique debate between Timothy Leary and Jerome Lettvin

By Steven C. Carhart, '70

Reprinted by permission from *The Tech* for May 5, 1967

Mr. Psychedelic ran head on into a passionate reaffirmation of the value of taking a vigorous stand in life rather than "dropping out" in Kresge Auditorium on May 2. A capacity crowd was enthralled for three hours as Dr. Timothy Leary, founder and head of his own LSD religion, and Professor Jerome Lettvin of the Departments of Biology and Electrical Engineering debated possible ways of extricating the world from what they both agreed was a miserable situation. (*The event was sponsored by the M.I.T. Lecture Series Committee and open without charge to members of the Community.* —Ed.)

Red Rug and Slides

Dr. Leary, who spoke first, presented an impressive spectacle. Dressed in a

white pajama-like garment and seated on a large red rug, he spoke with a background of music and superimposed slides and film which supposedly depicted the LSD psychedelic experience.

After noting that fire and water are useful but can be misused (as can, he implied, LSD), Dr. Leary got down to business by discussing the need to drop out from what he called our "television studio society" and discover oneself. He added that man had always turned on, be it through flagellation, sexuality, or some other means. "Today," he said, "the sacrament is a chemical." Though he conceded that the "sacrament is a risk," he maintained that in our day of polluted air and Vietnam, "LSD is the best gamble in the house."

Only the Inside Counts

Appealing to the youth of the audience, Dr. Leary then urged his listeners to undertake the familiar program: turn on, tune in, drop out. The youth of today cannot afford to accept the "menopausal mentality" of their elders. The people in charge should realize, according to Dr. Leary, that it "doesn't make as much difference what goes on out there (in the television studio) as what you have in here." This, perhaps, was the most important point Dr. Leary had to make: the sanctity of the individual's body and his right to discover the depths of his own humanity, through drugs if he so desires.

Stresses Discipline

In closing his remarks, Dr. Leary stressed that LSD is a discipline and that the "Kingdom of Heaven is your body." Consequently, whatever drugs one might wish to take is his own business, while what happens in "Caesar's television set" is of no importance.

Professor Lettvin took the stage amid cries of "turn on" when his microphone failed to work. He cleared the deck for his main argument by agreeing with Leary that the individual ought to be able to take any drugs he desires to take. But he proposed that the logical arguments against LSD were strong enough to keep people from taking the drug without any government law.

Professor Lettvin characterized LSD as "a fundamentally vicious tool of the devil" on the grounds that unexplained relapses to behavior experienced under LSD even after use of the drug has been discontinued are sufficiently common to come to his attention on numerous occasions. Lettvin compared an individual unable to control his trip to a drunk or mental patient who may be in ecstasy but has lost his rational abilities. He cited case after case of people who lost their ability to do their work or became psychotic following LSD experiences. LSD, Lettvin concluded, is basically different from other escape drugs (alcohol, marijuana) in that the user is not assured that he will return to his pre-experience state of rationality.

PHOTO: LARRY-STUART DEUTSCH, '67, FROM THE TECH



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An Institute Gazette

Cambridge Highway

The apparently final decision of the Massachusetts Department of Public Works and Governor John A. Volpe is to locate the controversial "Inner Belt" highway on the Brookline-Elm Street route through Cambridge. The plans were fixed by Governor Volpe early in May; the eight-lane highway is to cut across Massachusetts Avenue near Central Square, and the many M.I.T. and industrial installations along the alternate Portland-Albany Street route will not be involved.

While the excruciating decision apparently ended the argument, it rekindled some of the anguish and bad feelings of earlier debates. Cambridge civic and political figures joined with several M.I.T. faculty in renewing calls for a complete investigation of the need for any artery through the center of the city. Indeed, only one voice in Cambridge—that of Alan McClennen, '47, City Planner—spoke out clearly for the chosen route.

The highway will take the homes of some 1,500 families and force moves upon industries employing about 2,700 people. Its cost will be over \$125 mil-

lion, compared to \$165 million estimated for the disapproved alternate. Though a good deal of planning to alleviate its consequences and capitalize on its opportunities has been going on, no one wants to say much about these efforts for fear of prejudicing the continuing protests. But in point of fact, says the Boston *Globe's* A. S. Plotkin, the "war of the Inner Belt in Cambridge is just about over," and the time to bring civic problems into the open will soon arrive.

One central fact, often ignored, is that Cambridge housing is in short supply. The growing demand results from the growth of academic and professional institutions. So low-income Cambridge residents are already feeling a housing squeeze. The Cambridge Corp., formed by M.I.T. and Harvard to help improve Cambridge residential facilities, has plans for several hundred units, and the *Globe* hints that M.I.T. has other plans under discussion but not yet ready for publicity. Since the highway will be depressed, air rights may be available; and Richard Green, '59, Vice-president of the Cambridge Corp., is also surveying vacant property in Cambridge with the idea of moving houses out of the highway's path.

City for the Seventies

What will the city of the seventies look like? Will it be adaptable to changing public tastes? What facilities will it offer for energy distribution, transportation, and communication? Who will manage the enterprise? And where will the balance lie in the urban area of the next decade between aesthetics and functionalism?

These were some of the questions that students of Special Studies in Systems Engineering tackled in their Spring semester project, under the guidance of William W. Seifert, '47, Assistant Dean of the School of Engineering. Professors Dwight M. B. Baumann, '57, Siegfried M. Breuning, '57, Richard L. de Neufville, '60, and Philip B. Herr, '59, also participated in the project. Specifically, the 24 students in the course were asked to design a prototype subcity for a very high density of population and which would be easily adaptable to a largely unpredictable future. In addition to planning the purely physical aspects of the environment, they considered the management and financing of the undertaking.

Unlike the Advanced Space Systems Engineering group (see story on page 58), the students were able to assume that technological advances suitable to the seventies will be available by the time their design sees the light of reality. And they were allowed to start from scratch, rather than try to

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May 4, 1967.

incorporate their design into an extant city structure.

The students chose a site based on Thompson and Spectacle Islands in Boston Harbor. Within 20 years, their design would transform the water-fronted square mile into a high rise city of 70,000 residents and a working population of 30,000, at a cost of \$750 million. And, since the designers are M.I.T. students, the city would be equipped with all that future technology will offer—nuclear power, computer facilities and, in part, automated roadways.

From the individual dweller's point of view, the highlight of the report is the concept of the individualized, prefabricated apartment module. Coming in easily-handled cubic blocks, these modules can be stacked on high rise skeletal frames in the purchaser's chosen neighborhood. Any number of modules with movable walls can be fitted together to make a dwelling for two, or three or four or more. Socially, such units give their inhabitants security of ownership: if you get tired of your neighbors, you just uproot your modules and tack them on a new frame elsewhere.

Not only the modules are designed for instant evacuation. Floating foundations will give some of the buildings a choice of location which will con-

tribute greatly to the subcity's flexibility. For example, the students envisage the day when the college on their island will be floated *in toto* to the mainland.

If you wish to move around the model city without taking your house with you, you will have to make the choice between using automatic or manual traffic systems. After carefully pricing alternative transportation systems, the students decided to build ordinary roads on the island, but to phase in gradually an automatic glideway system, as developed in the Glideway and Metran projects of former years (see Technology Review, May, 1967, page 34).

Who would initiate this headlong plunge into the urban future? According to the report, between 10 and 20 corporations would join up in a jumbo consortium to set the scheme going. After the initial development work, a "popularly-elected government would emerge" to acquire public buildings and streets with a bond issue underwritten by the consortium. At the end of the 20 year period of development the city would have a valuation of about \$14,000 per capita resident. At that time a 1,000 square foot apartment would rent for about \$2,100 per year—certainly a competitive cost in the Boston area.

Geophysicist to Faculty

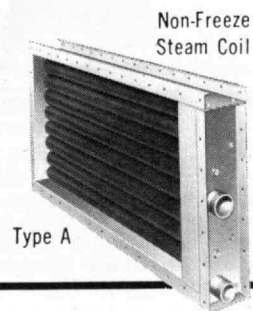
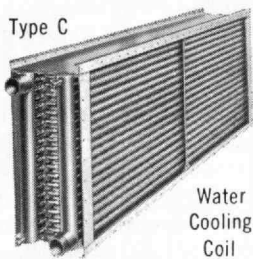
Irwin I. Shapiro, who as a member of the Lincoln Laboratory staff has been using radar to study characteristics of the solar system, has become Professor of Geophysics and Physics at M.I.T., with associations with both the Departments of Physics and of Geology and Geophysics.

Dr. Shapiro was the co-discoverer of the resonance effects of sunlight pressure on satellite orbits, has done research on the dynamics of small particles near the earth and within the solar system, and is the author of an important book on prediction of ballistic missile trajectories.

His present research involves the application of radar and celestial mechanics to determine the orbits, masses, and radii of planets with increasing precision, and he has recently proposed a new test of Einstein's general theory of relativity which would use x-band radar observations of planets as they pass behind the sun as a means of measuring gravitational effects on electromagnetic energy.

Born in New York City, Dr. Shapiro holds degrees from Cornell and Harvard Universities. He is the author of more than 50 scientific papers and serves on the Space Science and Technology Panel of the President's Science Advisory Committee.

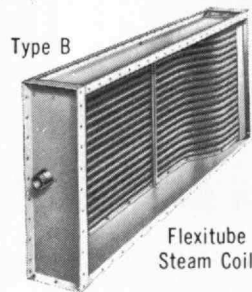
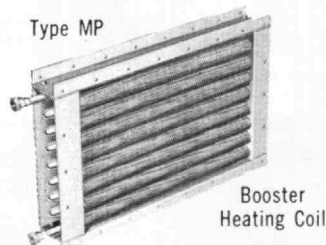
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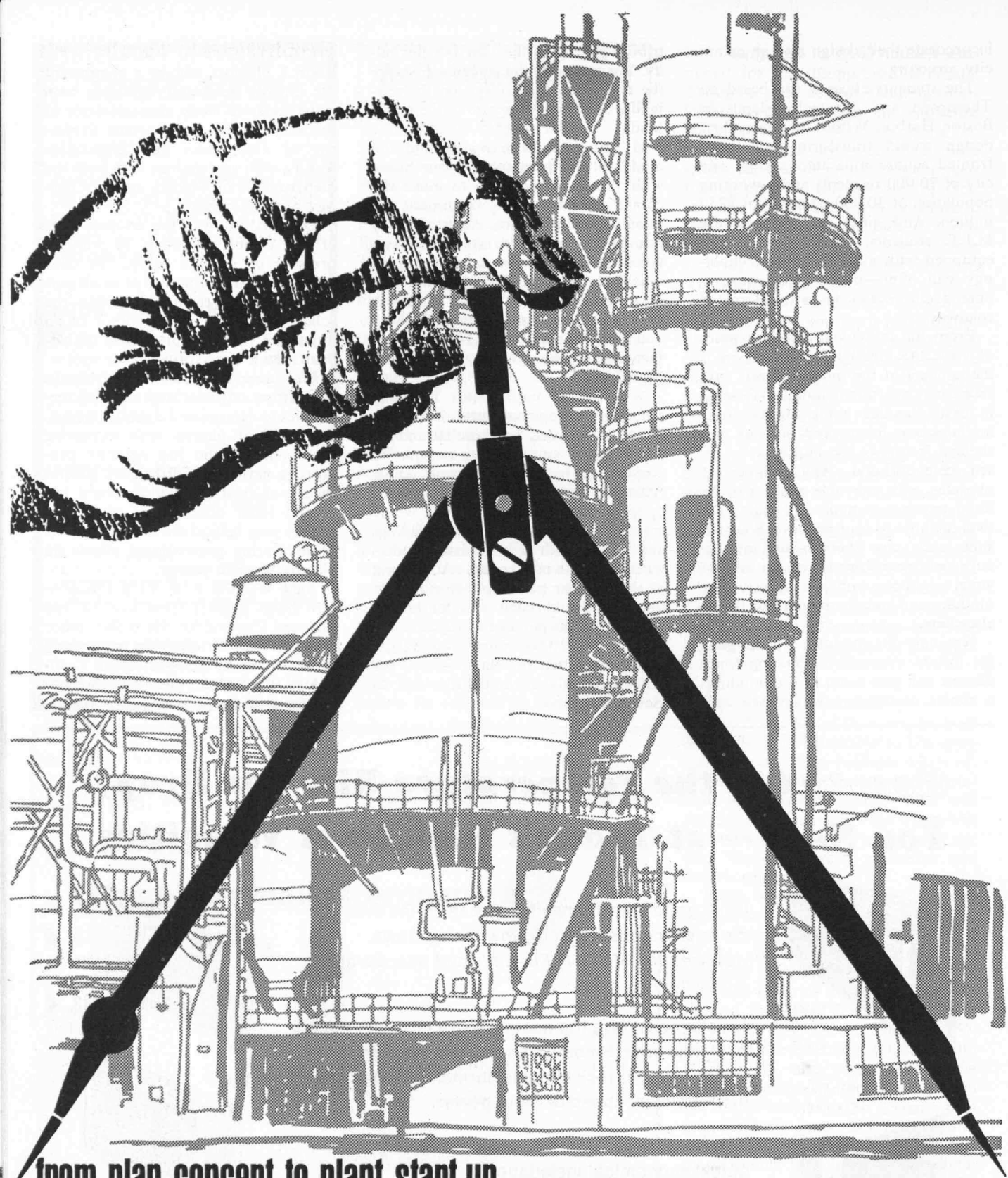


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CONSTRUCTORS

R. E. Freeman, 1894-1967

Ralph E. Freeman, Emeritus Professor of Economics who was Head of the M.I.T. Department of Economics and Social Science for 24 years, died suddenly on May 12. Born in 1894, he had retired from full-time teaching in 1960 but maintained a deep interest and activity in the Institute.

"For 36 years he had been an inspiring teacher, a force for the development of social sciences at M.I.T., and a warm friend of many of us," Howard W. Johnson, President of M.I.T., said in a special statement. Professor Freeman, he said, "was in a large measure responsible for the emergence of M.I.T. as a leader" in the fields of economics and the social sciences.

Professor Freeman was born in Canada in 1894, attended McMaster University, and won a Rhodes Scholarship from the University of Chicago while enrolled there for graduate study. After World War I service on the Western Front, he finally completed study at Oxford for the B. Litt. degree in 1921 and joined the faculty of the University of Western Ontario after one year of service with a cotton brokerage firm in Czechoslovakia. Professor Freeman came to M.I.T. in 1931 after two years in the investment business in Cleveland, and he and Mrs. Freeman became active and popular members of the M.I.T. community.

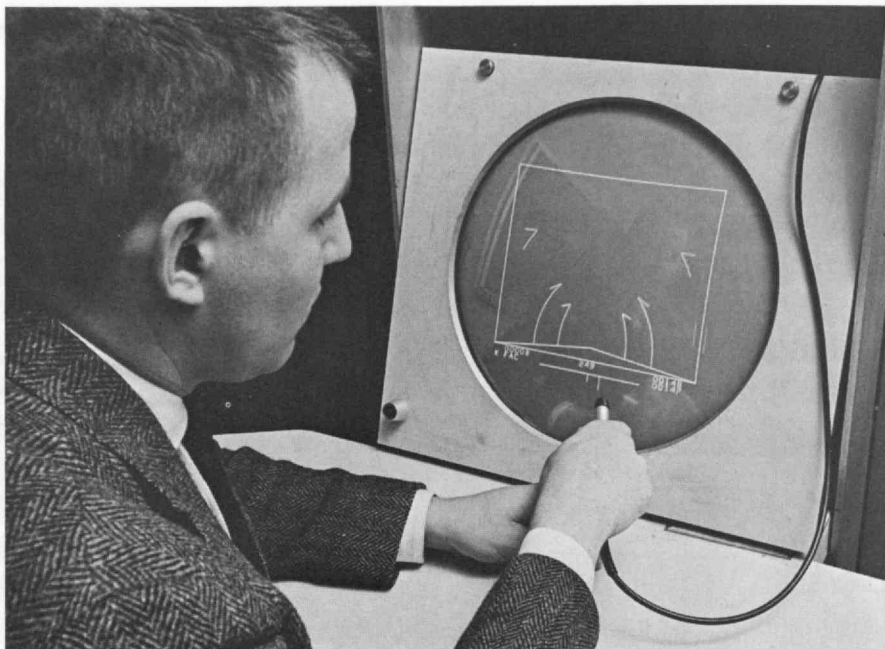
Professor Freeman was the author of *Economics for Canadians* and for many years was an economist for the United Business Service.

Education Research

M.I.T.'s Science Teaching Center has been renamed the Education Research Center and its mission has been broadened to serve the entire Institute—instead of only the Schools of Science and Engineering—as a resource for new teaching methods and equipment. Robert I. Hulsizer, '48, Professor of Physics, will continue as its director.

Jerome B. Wiesner, Provost, said in announcing the new plans that the center will provide staff, facilities, and a focal point for faculty members at M.I.T. interested in developing new college-level curriculum and teaching materials in such areas as humanities, the social sciences, architecture and management, as well as science and engineering.

Although it has no school of education, Dr. Wiesner pointed out, M.I.T. has been a major force in the wave of curriculum reform which has had an



If you were to streak down a road at nearly the speed of light, telephone poles would seem to bend over backwards since light has farther to travel to reach your eye from the top of each pole than it does from the bottom. Walter E. Daniels of the M.I.T. Education Research Center demonstrates this with the computer. Films of such computer-generated displays are being produced at the Center as aids in teaching such concepts as relativity and quantum physics.

impact on high schools and colleges throughout the country.

Among the projects begun in the Science Teaching Center and being continued now in the new Education Research Center is the development of a new introductory course in college physics, a study of the psychological responses of students as they adapt to

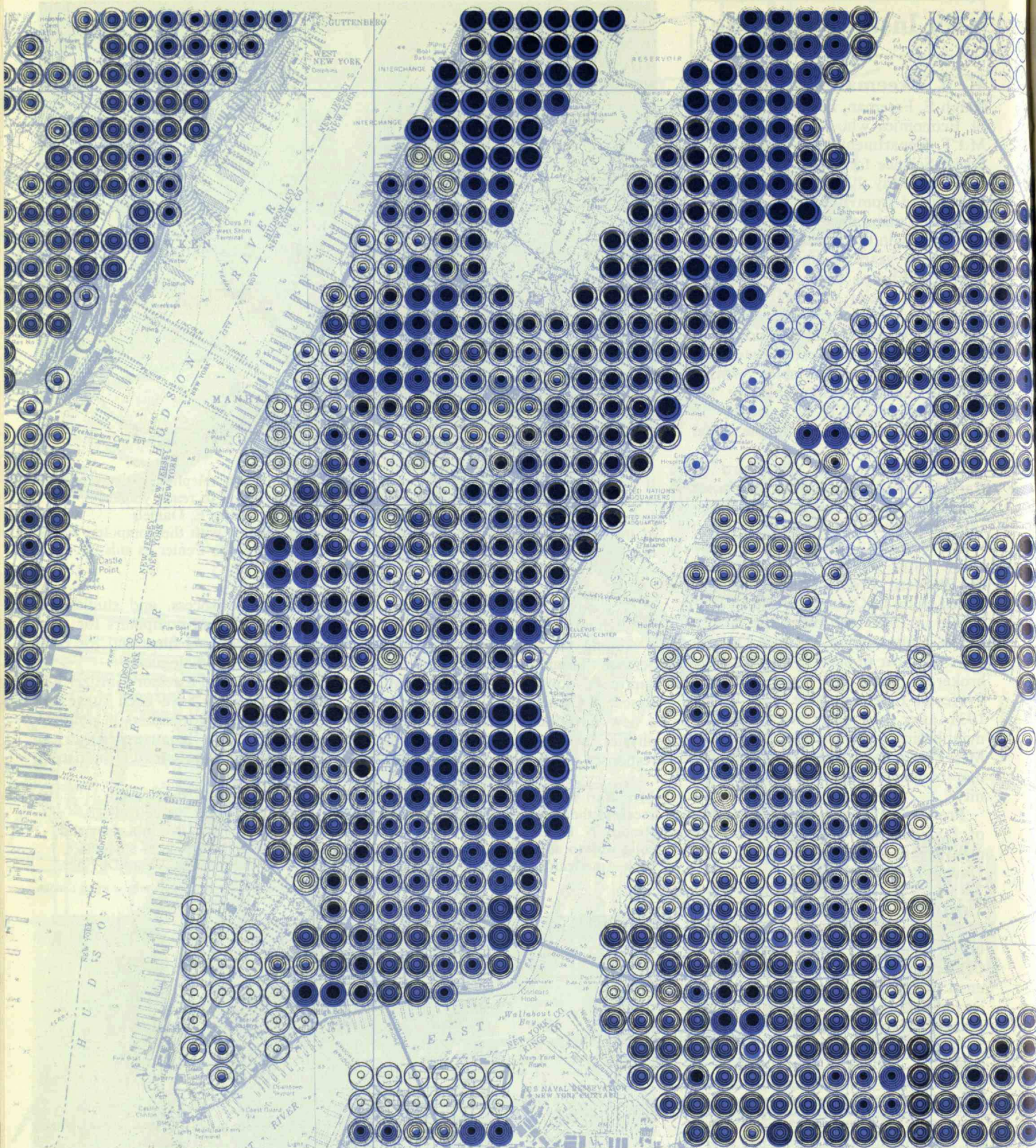
the learning process, and studies involving the use of computers for generating educational films and for conducting tutorial dialogues.

According to Professor Hulsizer additional projects have been suggested by M.I.T. faculty members in political science, modern languages, electrical engineering, psychology, industrial

Mrs. Karl T. Compton, wife of the late ninth President of M.I.T., this spring received the honorary Doctor of Humanities degree from Franklin Pierce College, Rindge, N. H. Mrs. Compton's citation noted that "she has contributed in a clear and solid way to advancing the spirit of a well-lived life in the thousands of students, both American and foreign, who have been directly and indirectly influenced by her."

PHOTO: STUART NORWOOD, MONADNOCK LEDGER





Residential population density: ○ 50-200 ⊙ 201-500 ⊙ 501-1200 ⊙ 1201-3600 ● over 3600

Personal income: ○ 0-\$250,000 ⊙ \$250,001-\$750,000 ⊙ \$750,001-\$1,500,000 ⊙ \$1,500,001-\$2,500,000
 ● \$2,500,001-\$3,750,000 ● \$3,750,001-\$7,500,000 ● Over \$7,500,000

This map, one of 63 in the M.I.T. Press' new *Urban Atlas: 20 American Cities*, plots personal income per unit area against population for the island of Manhattan and adjacent areas. The relative visual impression of a neighborhood's color—from light blue through dark blue to black—allows an immediate evaluation of a neighborhood's economic character. The publishers believe that the *Urban Atlas* can describe "every quantifiable feature of the modern city."

An Institute Gazette

management, chemical engineering and anthropology.

M.I.T. also plans, said Dr. Hulsizer, to look at the expectations students have of what they will learn and how they will learn it. This look at the student's view of learning, he said, coupled with the reassessment of the teacher's view of teaching, should open up the entire academic process for re-examination.

The center will employ all facets of research—operational analysis, planning, design, experimentation, engineering, testing and evaluation—in its approach to the problems of teaching and learning, Dr. Hulsizer said. "We hope," he added, "that faculty members will become as deeply involved in educational research as they now are in such areas as chemistry, engineering and city planning."

An Analysis of 20 Cities

A unique urban atlas, which brings together a massive resource of data on the population and economics of 20 American cities and embodies new techniques in both data-organization and printing, has been published by the M.I.T. Press.

The new book—*Urban Atlas: 20 American Cities* (\$100)—consists basically of the U.S. Geological Survey maps of the 20 major American cities (themselves never before collected in a single volume). But the real significance is that each map is supplied with overlays on which are printed colors and symbols representing different types of urban variables and their magnitudes. These include population density, personal income per unit area, non-residential land uses, distribution of churches and industries, non-white population changes, and others. And, in turn, the symbols representing the range of one variable are then overprinted on the symbols representing the range of others, allowing rapid visual correlations.

The authors are Joseph R. Passonneau, '49, Dean of the School of Architecture at Washington University, St. Louis, Mo., and Richard S. Wurman of the Princeton University architecture faculty; their work has been supported by four foundations, the National Aeronautics and Space Administration, and Washington University's School of Architecture and Institute of Urban and Regional Studies.

The arrangement of the various symbols in a grid across the maps of 20 cities is of considerable significance, according to the M.I.T. Press, because this method of data notation is espe-

cially relevant to computer analysis.

"One of the most promising areas," says the Press, "is prediction and extrapolation of trends, in which known past and present statistics are used as the basis for deriving future distributions of values. If the values of three past cycles are known, for example, the next one can be predicted with a good degree of confidence.

"Thus with income distributions for an area based on the censuses of 1950, 1960, and 1970, the probable incomes in the area for 1980 can be computed and plotted. Or, for example, using the distribution of Puerto Rican families in a city in 1960, 1965, and 1970, the likely distributions that will be obtained in 1975 can be computed and printed out directly on a map of the city," according to the Press.

Food Great: Bring Date

A threat—real or imagined—to close the cafeteria in Ashdown House this spring has resulted in a campaign which may be unique in the annals of college dining halls.

The talk began in the Ashdown House Executive Committee, where nearly 200 students (the largest meeting of the Committee in history) discussed ways to reduce the cafeteria's reported deficit without "a reduction in the present relatively admirable quality of the food." There has followed an aggressive campus campaign to urge students to "abandon vending machines and anti-acid tablets in favor of the relaxation of lunch at Ashdown House," to "take a secretary to lunch at Ashdown this week," and generally to patronize the "we-try-harder restaurant."

"We can offer," say the posters, "a varied menu of tasty meals, fast courteous service, a congenial atmosphere, and extra special services like box lunches to take with you at no extra charge."

Old Business

From the minutes of the House Committee of Burton House, May 1:

"BLANKINSHIP: The Harem was a success.

"BLANKINSHIP: Move to thank Burton Fifth residents and the people who moved out to provide sleeping and entertainment rooms for the convenience of the Spring Weekend Harem.

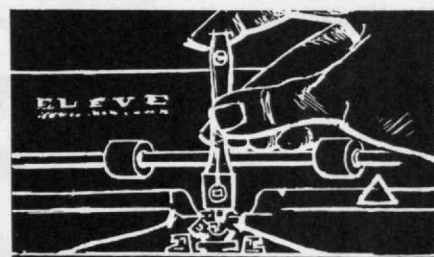
"HSE: Move to thank Bob Bressler, Mike Mann, and John Blankinship for their work on the Harem.

"BLANKINSHIP: Move to thank Professor and Mrs. White for the champagne and chery (*sic.*) hour and for the two breakfasts on Saturday and Sunday mornings of Spring Weekend.

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"WEITZ: Move to thank Mr. Lauricella, Miss Scott, and Miss Bobrink for the Spring Weekend dinner.

"HEAD: Move to appropriate \$45 for a beer blast for those residents of Fifth Burton and other members of the House who were inconvenienced by the Harem."

Definition: a Harem is a group of rooms vacated by their regular occupants and used by girls visiting for a major social occasion.—Ed.

Architectural Honors

M.I.T. Alumni figure prominently in the 1967 honor awards of the American Institute of Architects, announced during the AIA convention in New York in May, and one M.I.T. building received the coveted recognition, highest in the nation for architectural excellence.

M.I.T.'s award-winning structure is the Vannevar Bush ('16) Building for the Center for Materials Science and Engineering; the jury called it a "highly disciplined, well proportioned building" which expresses "modest architectural good manners in a classic setting." Its principal architect was Walter A. Netsch, Jr., '43, partner in

the Chicago office of Skidmore, Owings and Merrill.

Other honor awards involving members of the M.I.T. community:

- The Municipal Services Building in Philadelphia, designed by Vincent G. Kling ('41) and Associates ("a proud and dignified building, a forthright statement of its municipal function").

- University Plaza of New York University, by I. M. Pei ('40) and Partners ("an elegant plan—sensitive and simple").

- The Museo de Arte de Ponce, Puerto Rico, designed by Edward D. Stone, '27, for the Luis Ferre ('24) Foundation, Inc. (See Technology Review for December, 1966), which the jury called a "dignified and mannered statement" which "fits well to the climate and cultural needs of its location."

- The C. Thurston Chase Learning Center of Eaglebrook School, Deerfield, Mass. ("intimate, understated, and gracious"); the principal in charge for the associate architects was Walter E. Campbell, '26, of Campbell, Aldrich and Nulty.

Faculty Salary Survey

M.I.T. ranks ninth in the nation in the average salaries of its faculty, according to the annual survey of the American Association of University Profes-

sors.

The average faculty salary at M.I.T.—including professors, associate professors, assistant professors, and instructors—is \$13,953. Average total compensation, including salary for summer-term teaching where it applies and other "extras", is \$16,203, according to AAUP.

Harvard's figures—the highest in the nation—are \$15,000 and \$18,700, respectively. The other seven with average faculty salaries higher than M.I.T.'s are the University of Chicago, Parsons College, Stanford University, Hebrew Union College (Ohio), Johns Hopkins University, California Institute of Technology, and the Claremont Graduate School and University Center (California).

M.I.T. gets an "A" rating from AAUP for its compensation to professors (average at least \$19,630), associate professors (\$12,790), and assistant professors (\$9,890) and a "AA" for its rates for instructors, who average at least \$8,420 annual compensation.

The overall average compensation at 862 colleges and universities reporting to the AAUP was \$11,289, up 6.8 per cent over the previous year. Last year's rate of increase was 7.2 per cent, and AAUP called this change "a considerable drop," especially when meas-

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ured in absolute dollars. Twenty-four institutions reported average salaries for all ranks of less than \$7,000, one had an average of less than \$5,000 and paid even its full professors less than \$5,000.

The Class of 1971

M.I.T.'s freshmen in the Class of 1971 will number a few over 900, and they will be at least as well qualified as any entering class, according to Roland B. Greeley, Director of Admissions.

In all, M.I.T. received over 12,000 inquiries about the Class of 1971, and almost 6,000 of these inquirers returned preliminary applications. In the end there were 3,667 completed final applications (not including foreign students), and of these M.I.T. sent acceptances to 1,357 outstanding high school seniors.

As of May 15, Professor Greeley estimates that 924 students, including 53 women, will comprise the entering class next September. They will come from 49 of the 50 states—it now appears that only North Dakota will be without its representative in the Class of 1971. Twenty-two of the new M.I.T. students are offspring of M.I.T. Alumni, and five of them come from truly "M.I.T. families" in which two parents, or two generations of parents, are on the M.I.T. Alumni roster.

The total selection process includes not only the careful review of completed applications by the M.I.T. admissions staff, but also much self-selection to reduce the large number of initially interested students to the fewer than 4,000 final applicants. This self-selection process includes some "highly effective" work by members of the M.I.T. Educational Council, Professor Greeley points out, to help students discover whether they should consider entering the Institute. It also includes both wise and unfortunate decisions by potential applicants, based on information and misinformation offered up by Alumni, students, and others. Possibly the major challenge before the Admissions Office is to bring accurate information and fair "feelings" about M.I.T. to the potentially interested high school students.

The new class' qualifications will be higher than ever. The rankings of all the applicants, Professor Greeley says, are so near the ceiling that "statistical analysis is pushed almost to its limit.

"Without significantly diluting the quality of the class," he says, "we could admit a group 50 per cent larger than the Class of 1971." The average scores of the rejected students on College Board examinations this year are the same as the average scores of the accepted applicants 10 years ago.

In the selection of the class, he says,

there is "no conscious prejudice" for or against children of alumni, residents of certain geographical areas, or members of any race or creed.

"The major constraint on the size of the Class of 1971 is that of housing," Professor Greeley reports. But if that problem were solved, some other constraints would soon appear.

Opposing Vietnam

The M.I.T. Graduate Student Council, elected representatives of the Institute's graduate students, has passed (by 13 votes to 10) a resolution calling for immediate cessation of U.S. bombing of North Vietnam, recognition of the National Liberation Front as an independent negotiating party, and use of the 1954 Geneva accords as a basis for peace settlement.

Citing M.I.T.'s status as "the tenth largest Defense Department contractor" as well as its role in the education of future national leadership, the Council said, "To remain silent at this time serves, in effect, to support a dangerous and unconscionable national policy."

Phi Beta Kappa

M.I.T. will make formal application to the Phi Beta Kappa Society for the establishment of a local chapter of the national organization honoring undergraduate achievement in liberal studies. The Faculty Council has approved

the action, and members of Phi Beta Kappa, initiated in other chapters but now at the Institute, have added their support.

Aberthaw Contractor

The \$6.4 million contract for construction of M.I.T.'s Camille Dreyfus Building for research and teaching in chemistry (see Technology Review for June) has been awarded to the Aberthaw Construction Co., and work on the site began late in May. The structure will be built of architectural concrete to contain 135,000 square feet of space devoted to laboratories and associated support systems, offices, seminar rooms, and a library; the architects are I. M. Pei, ('40) and Partners of New York.

Foreign Student Adviser

Harold L. Hazen, '24, becomes M.I.T.'s Foreign Study Adviser on July 1, following his retirement as Dean of the M.I.T. Graduate School. In this post he succeeds Professor Emeritus John T. Norton, '18, who became the Institute's first Foreign Study Adviser in 1963 upon retiring from an active teaching career in the Department of Metallurgy. Working closely with both the M.I.T. faculty and the faculties of foreign universities, Professor Norton personally advised those students whose future careers would most benefit by foreign study. His ef-

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forts in establishing policies for overseas study have resulted in two measures recently adopted by the M.I.T. faculty. Beginning with the academic year, students whose overseas programs have been approved will be listed officially as M.I.T. students registered for foreign study, and they will be eligible for student aid just as if they were in residence at M.I.T.

Nine Retire

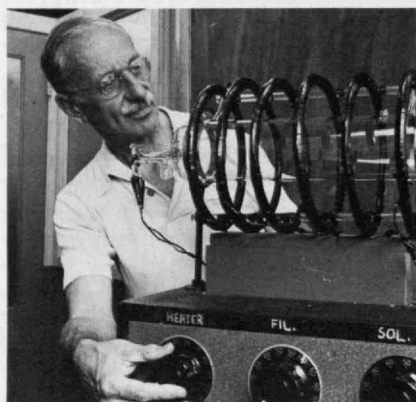
Partial retirement has come this summer for nine long-time members of the M.I.T. Faculty; all of them will continue with part-time teaching assignments next year. The nine are:

- William P. Allis, '23, Professor of Physics, whose distinguished scientific work has been in the field of electrical discharges in gases.
- Howard R. Bartlett, Professor of History who was Head of the Department of Humanities for 25 years.
- Alexander J. Bone, '24, Associate Professor of Transportation Engineering, a specialist in highway, airport, and transportation systems problems.
- Jacob P. Den Hartog, Professor of Mechanical Engineering, leading authority in the field of complex mechanical vibration problems.
- Giorgio D. de Santillana, Professor of the History and Philosophy of Science, a prolific scholar on Galileo and the history of scientific thought.
- Charles S. Draper, '26, Institute Professor and Professor of Aeronautics and Astronautics, whose applications of the gyroscope to navigation and control problems has brought international fame to him and to M.I.T.
- Harold L. Hazen, '24, Dean of the Graduate School, a pioneer in the development of servomechanisms and computers.
- Paul N. Rosenstein-Rodan, Professor of Economics, a prolific research worker in problems of economic development.
- Bertram E. Warren, '24, Professor of Physics, an authority on X-ray studies of the crystal structure of complex materials.

In reporting their retirements to the Faculty, Howard W. Johnson, President of M.I.T., noted that these teachers "represent every aspect of our work, have devoted their lives to making the Institute what it is today.

"We are very much in their debt," he said.

Professor Allis' degrees are from M.I.T. (S.B. 1923, S.M. 1924) and the University of Nancy (D.Sc. 1925), and he also studied at Princeton, Munich, and Cambridge Universities. His



William P. Allis, '23

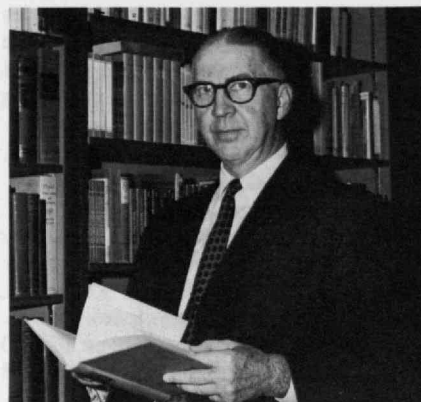
For me to speak of Will Allis is to speak of a friendship of more than 40 years, of a partner in various ventures, of a companion with whom I have roamed over many strange parts of the globe. In our youthful days we had a lot of fun together and many exciting times. But there were serious moments, too, and serious thoughts. And so for me to speak of Will Allis is to speak also of the days when this M.I.T. of ours was changing—of a time when our generation saw the beginning of a sweeping transformation in the spirit and outlook and substance of this institution. Indeed, he was in the vanguard of the young Turks of the late twenties who wanted and worked for a new kind of Institute, who saw with satisfaction a new era begin not only for physics but also for the quality and character of science at M.I.T.

Then it was that he began to probe deeply into the theory of ionized gases. With the coming of the war, his knowledge of plasma physics bore directly upon the magnetron oscillator—the vital heart of microwave radar. Later he delved into the fascinating new field of scientific intelligence. Finally he returned to plunge with all his inexhaustible energy and enthusiasm into his plasma research and took up his place once more as a member of the Faculty. Many a student is grateful for his interest, his attention, and his concern. Again and again over the years Will Allis has given his time unsparingly to the affairs of the Institute. And at the very height of his career, reluctantly and at the sacrifice of all his personal interests, he interrupted his work here to serve as a scientific adviser to NATO wholly out of a sense of duty and civic responsibility.

I welcome this opportunity to pay him tribute—an appreciation of his devotion and contributions to science, of his unflinching concern for his students, and of all that he has done for M.I.T.

—Julius A. Stratton, '23

President Emeritus of M.I.T.



Howard R. Bartlett

Years ago, when the Institute was a somewhat simpler place, the custom was for department heads to introduce each duly named assistant professor to the Faculty in meeting assembled. When the great day came for Howard Bartlett he rose and unassumingly told a story. It was the adventure of a Down-Easter who visited a great scientific institution and listened for a long, long time as a devotee of research expatiated on the rich values of his investigation of a fluid which would possess supreme corrosive powers—which would, in short, be a universal solvent. At the close of the harangue Professor Bartlett's Down-Easter friend asked gently, quietly, "What are you going to keep it in?"

The case puts into epitome some qualities of Howard Bartlett which have benefited many generations of students and contributed massively to the advance of the M.I.T. Consider the aptness of the story for time and place. Consider the patience of the listener, the searching shrewdness of his question, and the combination of quiet humor with gentle respect and the sense of the fitness of things which marked its delivery. These qualities made Professor Bartlett a good teacher; they were later to stand him in good stead as an able and perceptive head of his department through more than two decades of very troublous times for all academic institutions.

Finally, all these qualities had preeminent expression when, in 1958, Professor Bartlett accepted appointment as Master of Burton House and took up residence there with Mrs. Bartlett. Professor and Mrs. Bartlett pioneered the advance from Resident to Master in M.I.T.'s houses, and in so doing, they fostered in hundreds of ways the growth in intellectual spirit and purpose of the men who shared residence with them.

—F. G. Fassett, Jr.

Dean of Residence, Emeritus



Alexander J. Bone, '24

Professor Bone's service to the Department of Civil Engineering and, indeed, to the entire Institute has been marked by loyalty and dependability which, over the years, have won for him the respect of both his colleagues and his students.

In his quiet way, Professor Bone has steadily pursued the goal of excellence; and in the field of transportation engineering—where highways and airports have held his special interest—he has merited his reputation for thoroughness of approach and soundness of conclusion.

Professor Bone has always been active in research, but I believe it correct to say that he viewed this phase of his endeavors as a means of strengthening the subjects he taught, rather than as an end in itself. He sought new knowledge and new methods of procedure to vitalize his courses and keep them up to date; but his greater interest has been in the welfare and progress of his students.

—John B. Wilbur, '26
Consulting Professor of Engineering



Jacob P. Den Hartog

Professor Den Hartog has been one of a small number of men who have made an engineering science out of what had previously been the art of engineering vibration control. He is probably the most influential member of this group because of an extraordinary combination of qualities.

Professor Den Hartog is first of all an engineer rather than an applied scientist. That is, his work is always directed toward an engineering objective, and the Elysian Fields of mathematical formalism never entice him from the straight and narrow path. He uses mathematics to understand all the implications of the simple governing phenomena which his superb intuition discovers.

Secondly, he is articulate, skillful and entertaining as a lecturer. His students, his colleagues, and an international audience are indebted to the lucidity of his lectures for an understanding of hitherto obscure phenomena. He is a teacher dedicated to finding a common ground on which to stand with his students as they build a structure of understanding.

Thirdly, he is articulate as a writer. His textbooks have trained several generations of engineers in mechanics, strength of materials, and vibrations. His style is direct and to the point. The art of engineering shines through in the skillful selection of the idea essential to the solution of each kind of problem. His analysis is kept focused on the reality of the mechanical device. He seeks and finds the practical answer.

—Joseph H. Keenan, '22
Professor of Mechanical Engineering,
Emeritus



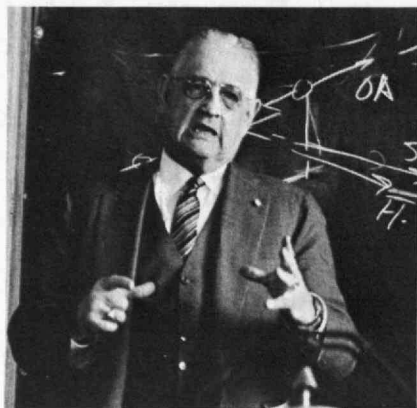
Giorgio D. de Santillana

When you go to the door of Giorgio de Santillana's office, a pretty young lady will answer your inquiry about Giorgio's whereabouts in a strong French accent. "Heez een there," and she smiles. Or if she says, "I don't know where he is," she will look troubled. But she does know. Giorgio will either be at UNESCO in Paris, or at The Royal Society in London, or in Florence, Venice or Rome, or Washington, Cincinnati, or Corpus Christi. If you persist, her smile will return, "He'll be right back." The next morning he will be in the inner book-lined fortress with Jerry Lettvin, Hertha von Dechend, Nathan Sivin, and students working out new plans for his courses in Biological Bases of Perception or Cosmological Theory. I have joined many of these sessions to come away both enlightened and mystified.

Giorgio's mind and interests are wide. He moves from Parmenides to T. S. Eliot, from Plato to Proust, and from Galileo to Oppenheimer, from the Ancient Hebrews and Greeks to Op Art. I have known him for 10 of his 30 years at M.I.T., and I have sought his advice on planning courses and seminars. His ideas and participation have always been fresh, stimulating and generously given. Students work for him in a devoted way few of us can inspire.

Underneath all his study and views is the search for truth, whether it be in the life of Galileo or modern political or scientific systems or the astronomical bases of myth. In searching for truth he searches for things that fit together. "If it fits together," he says, "it's probably true. My motto is," adds Giorgio, "anything to annoy." And the full expression of his motto has annoyed half-truth tellers in many fields and has produced much of Giorgio's distinguished work in the history of science.

—Roy Lamson
Professor of English



Charles S. Draper, '26

Few men reach the high point of leadership which Charles Stark Draper has in aeronautics and astronautics. In the four decades of his professional life, two features stand out: He has always worked on the research and development forefront, where his direct contributions have been unusually great; and his many students, inspired by his energy and enthusiasm, his wisdom, and his personal involvement, today occupy positions of responsibility in industry, in academe, and in government, both civil and military.

In the early days of his career in aeronautics, when Dr. Draper sensed that poor instrumentation seriously limited flying, he began his work on the difficult problem of flight instrumentation. Before and during World War II these developments led him into work on gun sights for ships and aircraft, and, following World War II, into inertially guided aircraft, submarines and ships. Throughout the 50's his insistence on the development of completely inertially guided ballistic missiles won for him the right to design much of the equipment used in the ballistic missiles which are our principal deterrent forces. When space burst upon the world, Dr. Draper turned to a new challenge. Even now, at the end of his academic career, he is still deeply immersed in the guidance equipment for the manned moon flights.

His life has been characterized by leadership on the technical forefront of guided flight. And most of all, his impact as a person on his associates in the Department of Aeronautics and Astronautics has made him remembered as a teacher extraordinary.

—H. Guyford Stever

President

Carnegie Institute of Technology



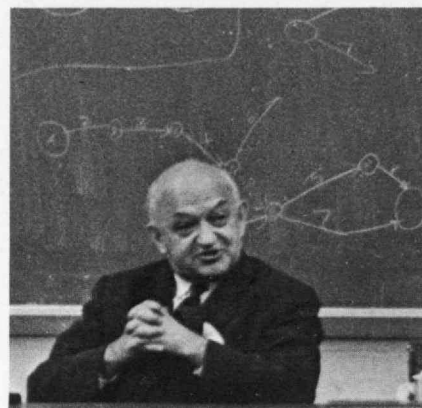
Harold L. Hazen, '24

The attitude of the students and faculty sets the tone of an educational institution. It is strongly influenced by a few who especially emphasize by their personal attitudes and accomplishments the key phases of the atmosphere which prevails.

Harold Hazen, in his distinguished career at M.I.T. from teacher in electrical engineering to Dean of the Graduate School, contributed notably to many aspects of the character of his institution. He has been a good teacher, soundly based in his subject, clear in his exposition, interested in his students. His research has added to our understanding of circuits and devices. But his finest contribution has been that he has added a sense of dignity and scholarship to everything he has touched. Engineers do not always value these attributes highly, but they appreciate them when they are soundly exemplified. So M.I.T. is just a bit more soundly balanced in its attitudes because of Harold Hazen's presence among us.

Nor should we, in this connection, forget that the women among us influence our attitudes, perhaps at times fully as strongly as the men. Katherine Hazen, by her gracious and scholarly contributions to our affairs, has added much.

—Vannevar Bush, '16
Honorary Chairman of the Corporation



Paul N. Rosenstein-Rodan

Paul Rosenstein-Rodan comes as close as anyone I have ever known to being the universal man. He had an Austrian father and a Polish mother, has for 30 years been a citizen of the United Kingdom, is regarded as virtually a native of Italy by his extensive circle of friends there, and is on a first-name basis with presidents and cabinet ministers throughout Latin America. M.I.T. has indeed been fortunate to have him in residence in Cambridge for the past 14 years. He established an early reputation as an economic theorist in the 1930's. With his accustomed foresight he perceived that the field of economic development of the underdeveloped countries was to be a critical one long before it achieved the fashionable popularity which it now enjoys. His pioneering article on the "Problems of the Industrialization of Eastern and South Eastern Europe" published in 1943 is a landmark which is included in most of the collections of readings which have been published on this subject since. His theory of the big push is one with which all students of development must cope. As director of two large projects of the Center for International Studies, one concerned with the economic development of southern Italy and the other with economic problems of Indian growth, he stimulated a large shelf of distinguished contributions to the development literature, only a few of which bear his name.

Since coming to M.I.T. he has established himself as a leading expert on the economic problems of fuel and energy and has pioneered in bringing together technical and economic considerations in the field of nuclear power.

—Max F. Millikan
Professor of Economics



Bertram E. Warren, '23

In the retirement of Professor Bertram E. Warren the Department of Physics loses a member who, after being successively undergraduate and graduate student at M.I.T., has progressed through all the faculty grades while acquiring an international reputation as an expert in the determination of the structure of matter by means of X-rays.

Young Warren graduated from the Institute in physics in 1923, and went on to receive his doctor's degree here in 1929. He also studied for a year at the University of Göttingen and the Technische Hochschule in Stuttgart, and after receiving his doctor's degree he worked for a time with Sir William Bragg, noted British X-ray scientist at the University of Manchester.

Professor Warren has built up at M.I.T. a research laboratory in which X-ray diffraction is used to probe the structures of both crystalline and amorphous matter, from which have appeared a long series of scientific papers which have made both the laboratory and its director world-renowned.

More than 70 scholars have done their thesis work under Professor Warren, and recently a number of these former students arranged a reception and an all-day symposium in his honor. More than half of the men who had worked with him were able to attend, one scientist coming from as far as Melbourne, Australia. Two hundred attended the symposium, including many who had taken one or more courses in X-rays and crystal structure from Professor Warren.

In 1968 Dr. Warren plans to visit under Fulbright auspices the College de France in Paris for six months to deliver a series of lectures on X-ray Diffraction Studies of Non-Crystalline Matter.

—George R. Harrison
Dean Emeritus

professional career has been spent entirely at the Institute; he returned as an instructor in physics in 1931 and joined the faculty in 1934, and he has been away since then for duty with the National Defense Research Committee in World War II and as Assistant Secretary General for Scientific Affairs to NATO (1962-64). His research on gas discharges and fusion power is well known, and many of his students are active in this important field.

Professor Bartlett joined the M.I.T. Faculty in 1929 following education at Dartmouth and Harvard and teaching experience at Haverhill (Mass.) High School. Eleven years later, in 1940, he became head of the Department of Humanities (then English and History), and he relinquished this post in 1962 to devote full time to teaching. Meanwhile he had served for one year in India as consultant on general education for the Indian Ministry of Education, and later he returned to help establish the Birla Institute of Technology and Science. He was Master of Burton House from 1958 to 1963.

Transportation has been Professor Bone's interest ever since his graduation from M.I.T. (S.B. 1924); he first taught at the Institute for three years, then was engaged in professional practice in the design of roads and utilities until 1933 when he returned to teaching and research at M.I.T. Since then he has headed the Department of Civil Engineering's transportation division and the Joint Highway Research Project with the Massachusetts Department of Public Works, and he has worked on highway, airport, and—most recently—Northeast Corridor transportation design and economics.

Born in Java and educated in Holland, Professor Den Hartog came to the U.S. in 1924 to join the Westinghouse Electric Co., where he worked on mechanics research until entering the U.S. Navy in 1941. After World War II service with the Bureau of Ships working on vibration problems, Professor Den Hartog took up his M.I.T. appointment in 1945, and was head of the Department of Mechanical Engineering for four years starting in 1954. His work in applied mechanics has been widely recognized and honored.

Professor de Santillana is one of the world's most respected science historians, though his career began with undergraduate study and teaching in physics and graduate study in philosophy in Rome, Milan, and Paris. He came to the U.S. in 1936 to lecture at

Middlebury College, the New School for Social Research and Harvard, joining the M.I.T. faculty in 1941. Since then he has lectured throughout the world and written such important books as *The Age of Adventure*, *The Origins of Scientific Thought*, and *The Crime of Galileo*.

Professor Draper's education began with study in psychology (B.A. 1922 Stanford) and has also included electrochemical engineering (S.B. 1926 M.I.T.) and physics (S.M. 1928, Sc.D. 1938). His career has been built upon exploiting applications of gyroscopes to increasingly sophisticated problems—fire control systems and ship, submarine, aircraft, and missile navigation—through inertial guidance. He holds many patents and awards, including the National Medal of Science, and is chairman of the National Inventors Council.

A career which began at M.I.T. when he enrolled as an undergraduate in 1920 has brought Dean Hazen to be Head of the Department of Electrical Engineering (1938-52) and Dean of the Graduate School (since 1952). His early work at the Institute following undergraduate and graduate study (S.B. 1924, S.M. 1929, Sc.D. 1931) was concerned with the network and differential analysis then being developed here, and his papers on servo-mechanisms are now regarded as classics. More recently he has been increasingly active in national and international engineering education activities.

Professor Rosenstein-Rodan came to M.I.T. in 1953 after a distinguished career at the University of London (where he was head of the Department of Political Economy from 1939 to 1947) and the International Bank for Reconstruction and Development (where he was assistant Director of the Economics Department). Throughout his period at M.I.T. he has been a member of the senior staff of the Center for International Studies, directing the Center's India and Italy projects, and he has been a consultant on economic policy for many U.S. and foreign agencies.

Professor Warren's retirement was marked this spring by a day-long symposium on current studies in diffraction physics, a field in which he has been a major contributor, arranged by the Center for Materials Science and Engineering. After completing undergraduate work at the Institute in 1924, Dr. Warren held fellowships for advanced work which led to M.I.T. advanced degrees (S.M. 1925, Sc.D. 1928) and included periods of study at the Universities of Göttingen and Stuttgart. He studied for several months with Sir William Bragg at the Univer-

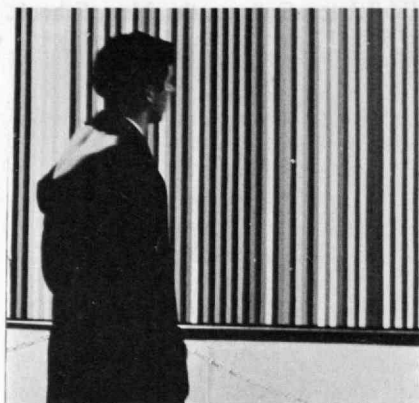


PHOTO: EDWARD J. LAMON, '67, FROM THE TECH

Recent M.I.T. acquisitions, including Gene Davis' "Klondike Calendar" (above), and works loaned by the M.I.T. Art Committee, will form a permanent exhibition in the Hayden Gallery and Courtyard during the summer (through September 18). Wayne V. Andersen, Associate Professor of Architecture, who is Chairman of the Committee on the Visual Arts, notes that the M.I.T. collection "has been growing especially rapidly in recent years;" this summer's exhibition will be chosen from nearly 300 works in all media plus several important outdoor sculptures.

An Institute Gazette

sity of Manchester, joined the faculty in 1930, and next January will hold a Fulbright lectureship on X-ray diffraction studies of noncrystalline matter at the College of France.

Track dominated the M.I.T. spring sports scene. Ben T. Wilson, '70, earned billing as "the greatest runner in M.I.T. history" when he broke M.I.T. and Briggs Field records in the two-mile run while taking first in the Greater Boston collegiate competition; earlier (below), he ran an impressive 4:14.9 mile but was caught between two Harvard men who finally finished first and second. Next year's track captain is pole vaulter Stephan J. Sydoriak, '68, who went 14 feet to give M.I.T. its first blue ribbon in the New England finals since 1964. The baseball season was less than successful: of 86 runs scored against M.I.T. by the last week of the season, exactly half had been unearned. The heavyweight crew lost the Compton Cup to Harvard by 5½ lengths, but Harvard's time was the best ever recorded on the Charles.

PHOTO: GEORGE J. FLYNN, '69, FROM THE TECH



Faculty Appointments

Three important faculty appointments have been announced at M.I.T. this spring.

Boris Magasanik, Professor of Microbiology at M.I.T. since 1960, succeeds Irwin W. Sizer as Head of the Department of Biology on July 1, when Dr. Sizer becomes Dean of the Graduate School.

Mason Haire, who has been a visiting professor at M.I.T. since September, 1966, has been appointed Professor of Organizational Psychology and Management in the Sloan School of Management, where he will lead work in the area of organization studies.

Allen Forte, a widely known music theorist who has done pioneering research on computer analysis of music, will join the M.I.T. faculty as Professor of Music in the fall.

Dr. Magasanik's research in recent years has centered on chemical processes inside the living cell. He and his students have identified and charted the two-way conversion cycle that enables bacterial cells to change one essential substance, adenine, into another, guanine, and vice versa, depending on cell needs.

Dr. Haire has been a pioneer in the application of psychology to the problems of management. His professional work has been involved with biological models as parallels for understanding the operation and development of organizations, the psychological conse-

quences of compensation patterns, and mathematical models which integrate organizational objectives, reward systems, management development, and the movement of personnel in the firm.

Last year, while holding a fellowship from the American Council of Learned Societies, Professor Forte conducted research at M.I.T. and developed for the first time a computer program to be used in studying musical structure. Beginning next fall, he will teach courses in the structure and theory of music, with emphasis on the use of the computer, and in music research and introduction to music. He will also continue his research, seeking to develop computer tools for the analysis of atonal music, the structure of which tends to be of such complexity that it resists the conventional theoretical approach.

For Art and Science

An important new project in the visual arts, bringing artists, sculptors, and film-makers into close collaboration with engineers and scientists, will open at M.I.T. next fall as the Center for Advanced Visual Studies under the direction of Gyorgy Kepes, Professor of Visual Design. The Old Dominion Foundation for Advanced Studies in the Fine Arts, Chicago, and others have provided funds.

No formal course work is planned in the new Center, but there will be seminars, lectures, colloquia, and exhibitions. Most of these activities will be carried out by artists in residence, who will be appointed as Fellows in the Visual Arts, working with students and faculty in architecture, city planning, science and engineering.

"The central concept is effective collaboration," Professor Kepes says. "Artists have become more and more isolated from the world in which they are living; most of them speak a private language and many of them tend to be too timid and too innocent. Meanwhile, scientists have opened a window on the whole cosmos, of which artists tend to remain in ignorance."

"In the great ages of the past," says Professor Kepes, "artists have been builders and thinkers. The Center is intended to encourage a renewal of this tradition in contemporary terms."

Among its activities, Professor Kepes speaks of experiments in the creative use of light, new aspects of environmental art, and the role of visual signs in communication. "Painters may experiment with the quality of light, its colors and patterns, and sculptors with forms of light in space. Film-makers may experiment with animated light to produce dynamic visual models."

Individuals Noteworthy

Robley D. Evans, Professor of Physics at M.I.T., has been named by the Federal Aviation Agency to head an advisory committee on the radiological aspects of high-altitude flight in the proposed supersonic transports.

Howard W. Johnson, President of M.I.T., received the honorary doctor of humanities degree at Tufts University, where he delivered the commencement address. He also addressed the graduating class of the University of Miami.

Russell C. Jones, Professor of Civil Engineering at M.I.T., has been awarded the Collingwood Prize of the American Society of Civil Engineers.

Alfred A. H. Keil, Professor and Head of the Department of Naval Architecture and Marine Engineering at M.I.T., has received the Gibbs Brothers Medal of the National Academy of Sciences for his work in the physics of underwater explosions.

Donald G. Marquis, Professor of Industrial Management, has been appointed to the U.S. National Commission for UNESCO by Secretary of State Dean Rusk.

William B. Murphy, President of Campbell Soup Company and Life Member of the M.I.T. Corporation, received the William H. Albers Trade Relations Award.

Irwin W. Sizer, Head of the Biology Department who will become Dean of the Graduate School at M.I.T., has been named to the editorial board of *Modern Medicine* magazine.

Huston C. Smith, Professor of Philosophy at M.I.T., is a Phi Beta Kappa Visiting Scholar for 1967-1968.

Robert M. Solow, M.I.T. Professor of Economics, will serve as the George Eastman Visiting Professor at Oxford University, England, for the academic year 1968-1969.

Charles H. Townes, M.I.T. Institute Professor and Professor of Physics received an honorary doctor of science degree from Yeshiva University.

Two M.I.T. Alumni received honorary degrees at Southern Methodist University on May 21: **Cecil H. Green**, '23, Honorary Chairman of Geophysical Service Incorporated (honorary doctor of science), cited as "a generous patron of and an untiring adviser to educational institutions"; and **Gordon S. Brown**, '31, Dean of the School of Engineering at M.I.T. (honorary doctor of engineering), whose "concepts for the education of engineers have had a profound influence on engineering education throughout the world."

Charles A. Thomas, '24, Director and Chairman of the Finance Committee of Monsanto Company,

received the honorary doctor of science degree at Simpson College (Indianola, Ia.) following his delivery of the commencement address there.

James S. McDonnell, '25, engineer-designer who founded the aircraft company that bears his name, has received the second Founders' Medal of the National Academy of Engineering. **Van-nevar Bush**, '16, was the first recipient.

Edward L. Mears, '30, is now senior vice-president of W. R. Grace & Co.'s Dewey and Almy Chemical Division.

Arthur E. Fitzgerald, '31, Professor of Electrical Engineering at M.I.T. from 1931 to 1954, has been named vice-president of academic affairs at Northeastern University.

Joseph T. Cimorelli, '32, is division vice-president and general manager of RCA Memory Products Division.

Maurice F. Granville, '39, is now vice-president and assistant to the chairman of the board in charge of strategic planning of Texaco Inc.

Brigadier General **Leo A. Kiley**, '39, Commander of the Air Force Missile Development Center at Holloman Air Force Base, is director of science and technology for the deputy chief of staff for research and development.

J. R. Foote, '40, is now chairman of the department of mathematics at the University of Missouri at Rolla.

(Continued on page 76)

INTEGRATED PROJECT CAPABILITIES

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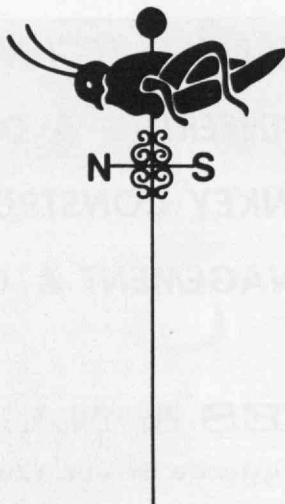
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An Institute Gazette

Art for M.I.T.

The rooms on the fourth floor of the Student Center strewn with easels, brushes, clay, and half-finished works of art attest to the success of M.I.T.'s extracurricular art program. So do nearly 100 M.I.T. students, most of whom had no previous art training, who now know the difference between acrylic and oil paints and additive and subtractive sculpture, and who, moreover, have undoubtedly experimented with each.

This is all largely due to the efforts of Mimi Luft, who came to M.I.T. in the fall of 1965 to establish the first extracurricular art classes. The results have been so rewarding that a good many people hope she'll continue the work indefinitely. The curriculum this year included six courses a semester with emphasis on "learning to express . . . basic pictorial, or design, elements of matter in two or three dimensions."

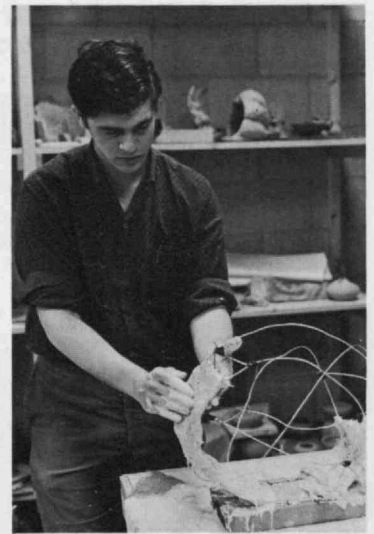
Mrs. Luft taught a mixed media class aimed at the curious beginner, who could draw, paint, print and sculpt with a variety of materials, sometimes using models but more often relying on experimentation. She also taught a life and portrait drawing and painting class.

Arthur Wood taught life drawing and painting, again working with various media and stressing the ability of the student to "see." Cora Pucci taught a mixed three-dimensional media class, teaching the basic principles of design. Problems posed in this class included work with wire, burlap, plaster, clay, wax and cement.

Lily Saarinen, guest artist during second semester, taught a course dealing with the possibilities of clay as a sculptural medium. Her students learned glazing techniques and used a kiln. Two potters wheels were also available in the laboratory for those who wished to work in pottery.

To further the students' interest in the art world, Mrs. Luft instituted a series of monthly tours of Boston's museums and galleries so that students might further their acquaintance with established artists and become acquainted with newcomers to the scene. Other activities this semester included three lectures: Peter Benjamin discussed film making, George Lockwood spoke on printmaking, and Gardner Cox on portraiture. There were also films on art and artists.

The program is open to students and members of the M.I.T. community for a \$5 fee each semester; an additional charge is made for materials.



PHOTOS: GUS P. KAYAFAS, '69, BRADFORD F. HERZOG, AND TECHNIQUE

The creative arts are a new feature of extracurricular life at M.I.T., thanks to studios in the Student Center and skilled tutoring by Mrs. Mimi Luft (back to camera, above), supervisor. The student work of this year included drawings (clockwise, above) by Ronald Chase, Mrs. Robert N. Nelson, and Robert N. Scanlan, '70; sculpture (Daniel E. Gordon, '70, and—lower right—Kenneth F. Manly), and ceramics (Mary Lou Brown).



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(Continued from page 73)

Jackson Graham, '40, is now general manager of the Washington (D.C.) Metropolitan Area Transit Authority.

J. Herbert Hollomon, '40, Acting Under Secretary of Commerce (see Technology Review for May, page 14, and for June, page 36) becomes President-Elect of the University of Oklahoma on September 1 and will be President in June, 1968.

Patrick M. Hurley, '40, Professor of Geology at M.I.T., has been elected president of the Geochemical Society for 1967.

Joseph F. Libsch, '40, Chairman of the Department of Metallurgy and Materials Science and Director of the Materials Research Center at Lehigh University, has been awarded an Alcoa Foundation Professorship of Metallurgical Engineering.

Julius P. Molnar, '40, Executive Vice-president of the Bell Telephone Laboratories, received on honorary doctor of science degree from Oberlin College.

Charles C. Gates, Jr., '43, is now president and chief executive officer of Lear Jet Industries Inc.

Eugene H. Morrison, '43, President of the Orange County Trust Company,

has been elected a director of the Federal Reserve Bank of New York.

Corwin Brumley, '44, is vice-president for research and development for Bausch and Lomb.

E. Alfred Picardi, '44, is now executive vice-president in charge of eastern operations for P & W Engineers, Inc.

Pete G. Peterson, '46, President of Bell and Howell Company, has been elected a member of the board of directors of The First National Bank of Chicago.

Anthony P. DiVincenzo, '47, is now acting manager of the Control Division of the Reliance Electric Company, and **Herbert Dessner, '52**, is now manager of engineering in the Systems Department.

Albert J. Kelley, '48, Deputy Director of NASA's Electronics Research Center, has been appointed Dean of the College of Business Administration at Boston College.

Denman K. McNear, '48, is now vice-president of Southern Pacific Company.

John S. Anderegg, Jr., '49, President of Dynamics Research Corporation, has named Alan L. Friedman, '53, senior vice-president, and Bradford W. Edgerton, '52, to succeed Mr. Friedman as vice-president in charge of systems.

William S. Edgerly, '49, Vice-president of the Cabot Corporation, is a

member of the board of trustees of the Committee for Economic Development.

A. Scheffer Lang, '49, who spent five years on the M.I.T. Faculty as an assistant professor of transportation engineering, has been nominated for the post of railroad administrator in the Department of Transportation by President Lyndon B. Johnson.

Mortimer M. Elkind, '51, of the National Cancer Institute, is one of five young nuclear scientists who have received the Ernest Orlando Lawrence Memorial Award for 1967 from the Atomic Energy Commission.

Charles L. Miller, '51, Head of the M.I.T. Department of Civil Engineering, has received the \$1,000 George Westinghouse Award of the American Society for Engineering Education.

Thomas Vasilos, '54, has received the 1967 Ross Coffin Purdy Award from the American Ceramic Society for his outstanding contributions to ceramic literature.

Harry B. Duane, '57, is now vice-president and director of international operations of the Norton Company.

Milton A. Zimmerman, '60, is now general manager of canned food production for Campbell Soup Company.

Donald B. Cotton, '61, has been elected vice-president for corporate planning of Investors Diversified Services.

Essential Tools for Safe, High-Tension Pulling Overhead or Underground

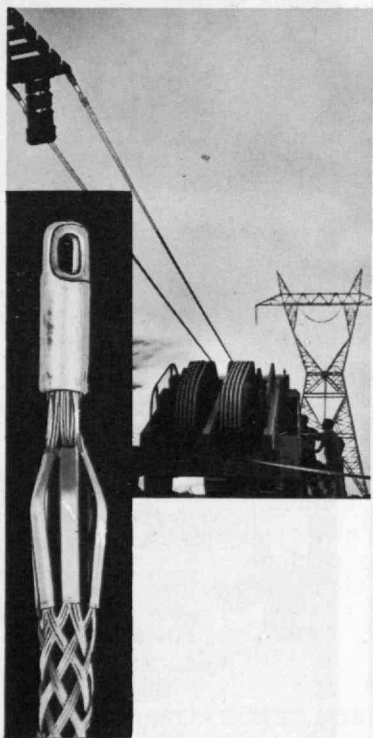
A common sight, particularly at this time of year, is the stringing of bare conductors across skeleton steel towers to transmit the ever-growing electrical power requirements to our cities, towns and rural communities.

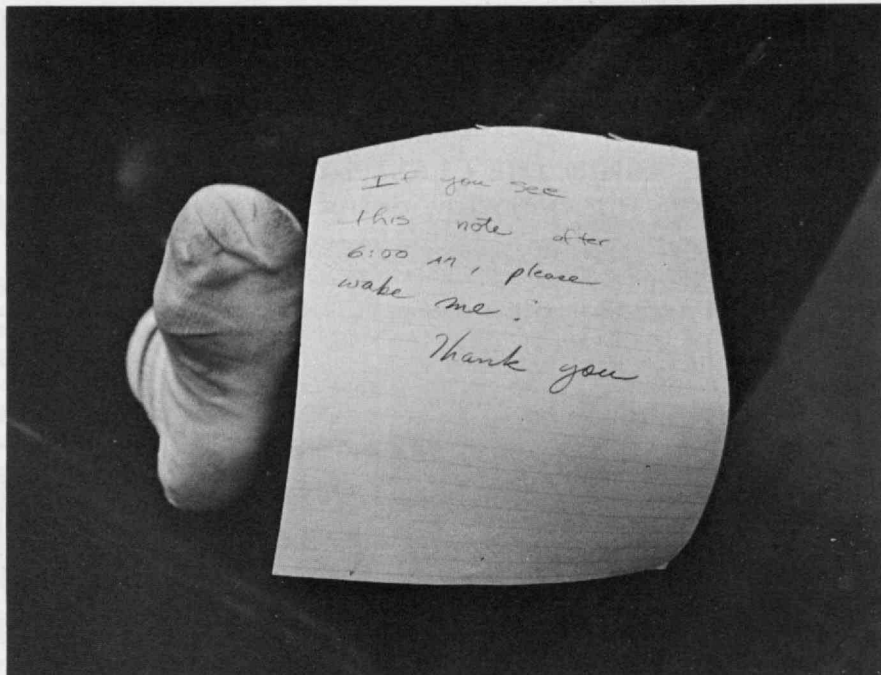
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The 1967 *Technique*, M.I.T.'s yearbook, is different. It is, of course, a book of pictures. . . . good ones, as those on this page testify. But it is also a book of words, and in this respect *Technique* departs completely and successfully from tradition. There are essays on humanities, student politicians, favorite faculty, "the identity crisis," how to let off steam, Cambridge and Boston, and so many other subjects that a perceptive reader of *Technique* may know quite as much about the Institute and its students as someone who has lived at M.I.T. all year without opening his mind to his surroundings. A few samples:

From the story of Nestor, "aesthete of the dorms:"
"None of this for Nestor; he rises at the break of dawn and, Withdraws his Thoma Sassa, copied in script by Addison-Wesley hermits. 'Line integrals today!' Nestor shows his joy in song. Satan awakes and shouts, 'Nestor, shut up, Goddammit!'"

From an essay by John C. Graves, Instructor in Humanities and Senior Tutor in Burton House: "As an educational institution, M.I.T. is truly unique and unparalleled. It cannot find its proper direction by simply following the tried and true paths of other universities. Instead, it must lead the way, striking out along new lines in the hope of achieving success and providing a new model for others to try to emulate. But this in turn leaves us with no standards of comparison. We innovate, we experiment, we make new departures. Yet we never know how to evaluate the results or determine what constitutes real success. As a result we become acutely self-conscious and sensitive to the attitudes of others, however ill-founded they may be. . . . In short, M.I.T. feels the loneliness of the leader who has chosen not to pass the buck any further."

From an essay on sports at M.I.T. by Richard L. Vaughan, '67:
"Football's advocates talk of spectators and of institutional pride; they have forgotten that the reason for sports is participation; and they fail to see that good athletic teams are a shallow source of pride at certain 'universities' that have nothing else of value to talk about."

From a letter to a high school student, by Michael M. Hammer, '68:
"'Tech is hell' is an old student slogan, but it has taken on a new meaning recently, that of a psychological hell for the new M.I.T. man. And so, my high school friend, you picked a poor time to be born for applying to M.I.T.; for if you'd be happy under the present system here, then you're probably not the type of person we're looking for. If you are the type of person we're looking for, you might try applying in five years—we'll be ready for you then. But then again, M.I.T. is in transition now, and a changing school is always an exciting place to be."

From an essay on "Pressure" by Maximilian J. Daamen, '70:
"Yesterday was September. Yesterday the world was bright with a warm autumn sun and colored with autumn leaves. But before the day was over, September's beauty had faded and the warmth had gone . . . A facade of indifference begins to engulf him before the term is over. The facade does not come naturally. It has to be maintained to hide his harassed pride. And the need for this cover increases his doubt in himself. He has known weakness before, but it has never appeared so paramount. Suddenly and unpleasantly he sees his complete self, never before so imperfect, so unstable. . . . On this road he continues—disillusioned, happy yet not really happy, satisfied yet dissatisfied with himself, hopeful yet not expecting anything better. Somewhere in his mind is the thought, 'Rewards are measured by the suffering for them.'"

more

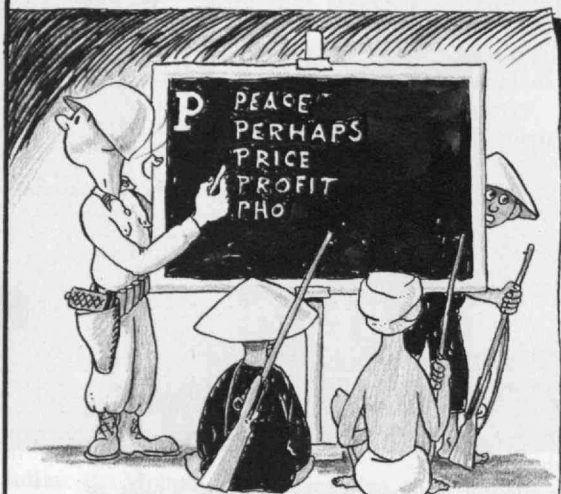
ALUMNI as noted

ONCE AGAIN THE CLASS NOTES SECTION OF THE REVIEW reveals the everyday doings of typical MIT alumni...

TECH IS HELL



He was there? The current Encyclopedia Britannica entry on "Hell" was written by Charles R. Sprich '61



Capt. Peter R. Banks '61 who, with 3 other Americans and 450 Popular Forces is surrounded by 2,500 VC's, teaches evening classes in English to Duc Pho merchants



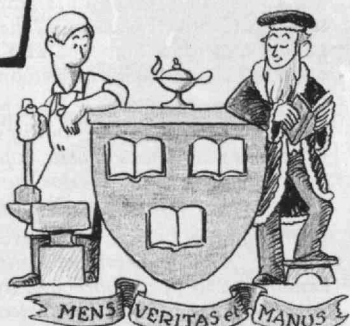
JUDGES

A flying wing, designed and built by Frederick J. Hooven '27, took the duration prize (10.2 sec.) in the Scientific American's Paper Airplane Competition

JOIN THE ARMY AND LEARN A TRADE



Maj. Gen. Alden H. Waitt '14, USA (ret.), former chief, Chemical Div, is now a professional painter, and Pres. & Dir., San Antonio Art Institute



MIT alumni group formed at Harvard Business School. Adopts new (and obvious) motto

Brig. Gen. Benjamin S. Kelsey '28, USAF (ret.), one-time MIT professor, does weaving "for fun and profit"



In mid-Pacific Joel I. Connolly '16 tossed over a bottle with a note... recovered 7 months and 2,100 miles later

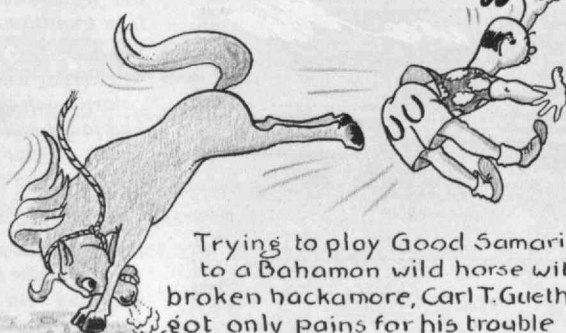
Robert M. Fano '41 is working on school computers to be used in students' homes ...teaching, giving assignments, grading....

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Stewart Keith '16 of Colorado tried a different kind of bullfight. Result: a draw.... wrecked car, dead bull

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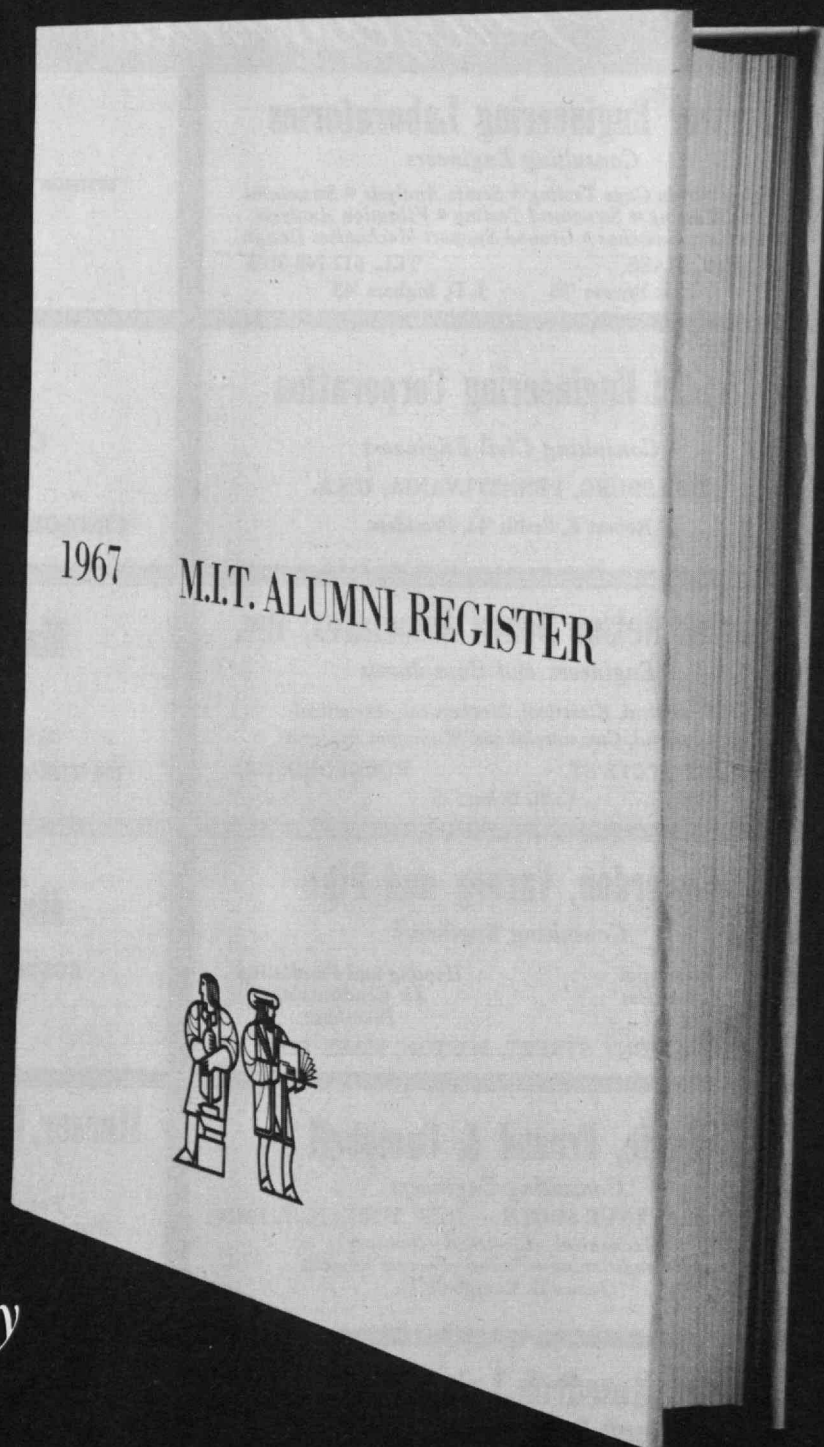
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'91

The following is reprinted from the Littleton (Mass.) *Independent* for May 10, through the courtesy of Mrs. Robert M. Murdock, daughter of the Secretary of the Class of 1891: "The Reverend William Channing Brown died on Saturday, May 6. A memorial service will be held at the First Unitarian Church, Foster Street, Littleton, on Sunday afternoon, May 14, at 2:00 P.M. Mr. Brown was in his 100th year. He was the Minister-Emeritus of the Littleton Unitarian Church, a former Selectman and Town Clerk of Littleton, and a long-time resident of the town. He was minister of the Littleton church at the turn of the century."

'96

The boat race on the Charles River for the Compton Cup was won for the 21st time by Harvard. The water was not too rough despite a fairly strong wind. The waiting for tides, as it used to be, is not necessary now that the dam has been built. Harvard won by 1½ lengths over Princeton, and M.I.T. finished third. The new boathouse located on the Cambridge bank of the river is the "last word" and was a refuge from cold wind while waiting for the race to start. I saw no gray hairs in the small groups along the shore, but mostly young students. There was one girl from the University of Maryland where her boy friend was on the crew in another race. Don't miss seeing the boathouse when you are in Cambridge.—**James M. Driscoll**, Secretary, 129 Walnut Street, Brookline, Mass. 02146

'03

A telescope built at M.I.T. is now circulating the Earth and working as planned. This gamma ray telescope circles our Earth at 350 miles altitude and scans the sky for evidence of interactions between cosmic rays and interstellar matter.

This is the report from our scientists and engineers at M.I.T., who designed and built the telescope. The gamma ray detector was one of nine experiments launched March 8 aboard the National Aeronautics and Space Administration's Orbiting Solar Observatory III.

A radio signal, broadcast March 10, turned the telescope on and within hours the M.I.T. group confirmed the device was working as planned. When pointed toward Earth, the telescope detects numerous gamma rays emitted when cosmic rays collide with atmospheric particles. When pointed spaceward, the rate of detection of gamma rays is very much lessened. This is as it should be and this information gave the M.I.T. group confidence that the data which the telescope reports on gamma

rays from space will be reliable and accurate. The M.I.T. telescope is one of the most complex astronomical instruments ever orbited. It contains 15 photo multiplier tubes and more than 1,300 transistors. It is capable of selectively detecting gamma rays with energies of 100 million electron volts or more.

The telescope is expected to provide data essential to answering some perplexing questions about the universe; for example: From where do cosmic rays come, and what role do they play in the evolution of galaxies?

Goddard ends a six year college curriculum experiment, financed by a Ford Foundation grant of \$340,000. The findings have been printed in a 150 page volume, and have been distributed to the Union for Research and Experimentation in Higher Education; this volume is available to United States colleges and universities upon request. The report was prepared by Goddard and faculty members in various phases of adult degree programs. It centered its attention on four critical problem areas affecting teaching and learning in American colleges. These included helping students utilize the rapidly growing store of knowledge for the fullest possible development of their potentialities; aiding students to learn how to translate their impulses and desires into worthwhile purposes thereby organizing their lives to achieve these desires; eliminating the inability of students to perceive the relevance of what is learned in the classroom to the way they live outside the classroom; and getting students to assume and carry important responsibilities and to develop the capacity for independent study earlier in their college careers.

A very colorful postal card has been received from our counselor **Ike Atwood**, VI, and Mrs. Atwood while touring in Japan on their customary yearly vacation. . . . **William C. Twieg**, V, has a new address: 3015 Rosedale Drive, Port Arthur, Tex. . . . Our happy birthday greetings go to **Robert C. Jordan, Sr.**, II, of Columbus, Ga. for his 85th on April 25th, and to **Charles J. Griffin**, I, of 3 Mead Street, Everett, Mass. for his 85th on May 25th.

Our deceased members are **Louis W. Graves**, II, of Buffalo, N.Y. on December 28; **Andrew H. Hepburn**, IV, of Concord, Mass. on February 28; and **Ralph C. Jordan**, II, Columbus, Ga. on June 15, 1966.

We have the great pleasure to extoll another of our distinguished classmates in **James Winfield Welsh**, VI, of Winter Park, Fla. Jim was born in Springfield, Ohio, October 20, 1880. He was early enamored to his later profession by living close to the birthplace of Thomas A. Edison. Accordingly, he had a small workshop in his backyard where he performed the classic experiments.

The D'Arsonval galvanometer he built was so sensitive it gave a good deflection when two copper wires attached to its terminals were placed on one's tongue. He duplicated the current scientific exploit described in the news, for at the turn of the century, Marconi startled the world with "wireless telegraphy." To duplicate this, it was only necessary to set up an induction coil, previously built and producing a one half inch discharge, or radio wave, which

caused adherence of brass filings in a glass tube and a consequent deflection of the galvanometer.

Wittenberg College (not University) then provided a general education and by leaving the public schools after the sixth grade, James entered Wittenberg Academy instead of high school and secured his A.B. degree at 19 with the Class of 1900. However, in view of his interest in electricity, he was headed for "Boston Tech" but found it would take three more years to make up the sciences, so decided to take a year at Harvard College to include physics and construction mechanics, thus securing another A.B. degree. Jim then joined our classmates at M.I.T., culminating with the bachelors degree with honors in electrical engineering in 1903. He read his thesis at commencement.

After graduation, he was employed with the steel industry which was then electrifying its mills; he was employed by the National Tube Company, Wheeling, W. Va., as foreman of the metal yard. His next employment was to enter the Westinghouse Electric Corporation on an apprentice course of two years at the Pittsburgh shop. This occupation provided the opportunity to contact the Pittsburgh Railways Company which then operated most of the power generating stations of the Allegheny Power Company. He then became electrical engineer of the Pittsburgh Railways Company with responsibility for their electrical equipment for cars, and traffic, including car schedules.

In 1918 our First World War arose, so James was commandeered by the Emergency Fleet Corp. to handle transportation of war industries in the N. Y. area.

While in the Pittsburgh area, he married Ada Page Clement of Oakmont, Pa.; they were blessed with two sons, James W. Jr., now personal trust officer of Chemical Trust Bank, N.Y., and Clement W. Welsh, now canon, director of studies, and preacher at the Washington Cathedral.

After the War in 1921, our James was elected executive secretary of the American Railway Association, a position he held until 1929. As difficulties arose due to the modernization and development of the automobile industry, the conference committee developed the P.C.C. car and he was selected to be engineer in management. This car embodied the automobile design with rubber cushion tires, wheel sandwiches, and rail track brakes for acceleration in rapid breaking. The Transit Research Corporation was too late, for automobiles became too popular with the general public, and mass transit became increasingly unpopular. Accordingly, the Trade Association assumed a new name; it was changed from the American Electric Railway Association to the American Transit Association. All this eventually led to the closing of the railroad period.

In 1929 James took a position as assistant to the president of Cleveland Railway Company for several years and returned to New York City during the "depression period" as consulting engineer for business. When conditions changed, he became senior engineer for Ford, Bacon and Davis, New York City. This position afforded him the opportunity of being expert witness before commissions from

Montreal, to Charleston, S. C. and New York on business problems. During the Second World War the Office of Defense Transportation was set up as ODT and James assumed the new title of director of the Pacific Area region. Thus his employment with Ford, Bacon and Davis extended to 1950 when he decided to retire and enjoy the alluring atmosphere of Winter Park, Fla., and pleasant association with professional engineers at the local University Club, filling offices of vice-president and president in their active programs.

During his busy career, Jim has done much literary work. Among his accomplishments along these lines is: *Foreign Operations on Transportation in Great Britain, France and Switzerland* (1924), which included many valuable improvements in design for equipment in rail transportation. He is a fellow of AIEE.—**John A. Nolan**, Secretary, 13 Linden Avenue, Somerville, Mass.; **Augustus H. Eustis**, Treasurer, 131 State Street, Boston, Mass.

'04

I am sorry to have only bad news to report this month, that is three deaths. They are **J. Earl Cunningham** of 49 Russell St., Milton, Mass., who died on March 14; **John R. Sanborn** of 1961 Hart Street, Bethlehem, Pa., who died on April 2; and **Steven L. Bradley** of 115 Webster Street, W. Newton, Mass., who died on May 7, 1951. The class extends sympathy to the families.—**Eugene H. Russell, Jr.**, 82 Stevens Road, Needham, Mass.

'06

Maybe it will be summer in July but it is not even spring in the Northeast in mid-May, and what a winter! **Allyn Taylor** enjoyed it however, in St. Petersburg. In a letter to **Sherm Chase** after he was back home in Reading, Pa., Allyn allowed he'd had a pleasant sojourn there, playing golf several times a week with a long-time close friend also from Reading. . . . In line with a suggestion by Alumni Secretary Fred Lehmann, I invited four classmates to be my guest at dinner before the 394th meeting of the Alumni Council at the Faculty Club on April 24. One of them did come, **Eleanor Manning**, IV, and her husband Joseph O'Connor. We had a grand reunion recalling old times and old friends. Sherm sat across the table and joined in our conversation which was mostly by Eleanor, believe it or not. . . .

From the Alumni Office has come a belated report of the death on October 25, 1965, of **Jean Philip Varian**, III, S.B., probably in Denver where he was born December 20, 1882. He had prepared at W. Denver High School and the University of Colorado and was a member of the Mining Engineering Society. His thesis, with F. R. Ingalsbe, was "Geological Classification of Joint Structures," with



James W. Welsh, '03

special reference to Middlesex Fells Reservation. After graduating he soon landed a job with the Arizona Copper Company, by 1910 was assaying and surveying with the Chance Hilltop Mining Company at Fairplay, Colorado. In 1915 he was assistant superintendent of the Prime Western Spelter Company at Iola, Kansas, and by 1920 had moved east to Palmerston, Pa., doing experimental work with the N.J. Zinc Company. That seemed to end Jean's professional career as he was soon back in Denver at 3170 W. 36th St., which was his address thereafter. However, in a way Jean had not ended his professional career, at least he soon embarked on another one, teaching at the Denver High School for some 20 to 25 years until he retired by or before 1955. Did Jean use his Tech training? I'll say he did! But he never paid any class dues, and I wonder if any classmate ever heard from him. . . . In the same category was **Alphonsus O'Farrell**, XIII, who was with us only three years, his home being 82 Dustin St., Brighton, where he continued to live until 1940 when he moved to Middlesex Rd. in Belmont. For several years, possibly until he retired, he was with the U.S. Engineers Office at 25 Pemberton Sq., Boston. He died February 3, 1966.

In the June notes the sudden death of **Michael Joseph Gibbons**, VI, on March 17 was reported, having been relayed by **Bill Abbott** who received a letter early in April from M.J.G., Jr. As Bill said, "Michael was prominent in church affairs, also in Dayton business. He had recently completed work on his hotel-motel, and it had been taken over by the Statler interests." Bill said that one of the daughters was expected to move in with Mrs. Gibbons, to whom I have sent a note of sympathy for the class. Mike's business activities began immediately after Tech with the family firm of M. J. Gibbons Engineer & Contractor, Heating, Ventilating, Plumbing and Fire Protection. Later he became secretary and then owner of the M. J. Gibbons Supply Company. During W.W.I as engineer and

superintendent of the former firm he supervised the installation of water supply, fire protection, plumbing, heat and ventilating, etc., at Wilbur Wright Aviation Field, also at Camp Sherman, Chillicothe, Ohio. So far as his business activities were concerned, I think that Michael hadn't retired, and probably never would. Somehow through the years he did find time to take an active and important part in numerous community, welfare, and church organizations. For example, in 1936 he listed the following: president, Chamber of Commerce (2 terms); Dayton Deanery of National Council of Catholic Men; Board of Lay Trustees, University of Dayton; the Setotype Company; Dayton Downtown Property Owners Association; past president, Dayton Mental Hygiene Association and Knights of Columbus Club; secretary, Ohio Mental Hygiene Association; director, Dayton Research Association and Catholic Youth Association and member of two national professional societies, ASME and ASH and VE. In 1960 **Jim Kidder** received a formal invitation, which I now have in my files, to attend the "Investiture as Knight Commander of Saint Gregory" of the to-be Sir Michael J. Gibbons KCSG who was so honored with 17 others by His Holiness Pope John XXIII. Michael was born in Dayton September 15, 1883, where his home address was 239 Main St. He prepared at Georgetown University, was a member of our freshman tug-of-war team and the gym team, of the varsity relay team junior year, of the Electrical Engineering Society, and president of the Ohio Club. In 1907 Michael married Bertha L. Kemp, and in 1936 five of their six children were living, two sons and three daughters. Through the years Michael helped to keep the class solvent and attended many reunions. Just last June at our 60th at Charter House he brought his grandson M.J.G., 4th. No better tribute can be made than to quote the comment Michael added at the end of his contribution to the proposed "30 Years After:" "Firm believer in the necessity of introducing 'moral and religious' education throughout our entire educational system to provide the stability so greatly needed in the U.S.A." How prophetic that was; if it was needed then, how about now! . . . The other death reported in the June notes was that of **Harold Cleveland Plummer**, III, S.B., who died April 12 in Phoenix and I am grateful to **Guy Ruggles**, III, and also to **Charles Willis**, III, for promptly informing me of his passing. Guy had phoned his sister Helen in Reading, and she passed it along to us. Then Guy wrote to me, and Charles sent an obituary clipping in the envelope of his Arizona Small Mine Operators Association. Harold was born November 26, 1884, in Cambridge, Mass., attended Mechanic Arts High School in Boston when his home address was 27 Glenarm St. in Dorchester. He was a member of the Mining Engineering Society, and his thesis was on the concentration of low grade copper ore. His first job, which he says he obtained through Tech and Charlie Locke, was as an underground rodman at \$90.00 a month with the Old Dominion Copper

Mining & Smelting Company at Globe, Ariz., then for a few years in Oregon, then briefly back in Dorchester. He soon was engineer with the Cananea Construction Copper Company in Sonora, Mexico, becoming assistant superintendent by 1920. By 1925 he was superintendent of Arizona Commercial Mining Company at Globe, continuing there until he retired in 1931 and became a "farmer" in Phoenix raising dates and grapefruit. Harold was a member of a Masonic Order in Globe and the Church of Religious Science. In 1910 he married Daisy B. Gibson who died in 1953. They had no children but Harold is survived by a brother and three sisters, one of whom is a 1915 M.I.T. graduate, Mrs. Julian Rice (Mary Elsa) of Mill Valley, Calif.

Not previously reported was the sudden death on April 25 of **Charles LeBaron Kasson**, VI, S.B., probably in Plaistow, N.H. He was born December 3, 1882, in Dorchester, prepared at Mechanic Arts High School, and lived at home in Dorchester while at Tech, was a member of the Electrical Engineering Society and his thesis was "Tests on Boston and Northern Street Railway Powerhouse in Lowell." For a few years he was employed by the Boston & Northern and Old Colony Street Railway at 84 State Street in Boston, then by 1908 he had joined the Boston Edison Company as a laboratory assistant. For a short time I also worked in the same laboratory. The soft coal for the L Street station was delivered by ship and sampled as discharged, these samples then being tested in a bomb calorimeter for sulphur, etc., at the lab. Charles continued with Boston Edison at 1165 Mass. Ave. but for a few years was on his own as a consulting engineer and was in charge during W.W.I. of power plant tests at the Watertown Arsenal, the Victory Plant at Squantum, and at Fore River Shipbuilding Plant near Quincy. He rejoined the Edison Company by or before 1925 as superintendent of the testing department, then (1929-1933) was a consultant to that testing department. From then on for most of the rest of his life Charles professed to be a consulting engineer, with some 15 different addresses in Massachusetts and New Hampshire. . . . In 1936 Charles had acquired about 100 acres of farmland and woods in Plaistow, N.H., near the Massachusetts line. The property contained a farmhouse, large barn and the usual other farm buildings which he put in good shape. He later sold most of the acreage, retaining a small strip along the state line where Jim and I visited him in August, 1960. Charles had been a prolific reader and writer, and a philosopher of sorts, for some years. He and I had corresponded at frequent intervals since Plaistow became his permanent residence. Through the years Charles had regularly attended reunions and most alumni days. Almost every year since 1916 he had sent his class dues, a truly loyal classmate. For the 1916 class directory Charles reported that in 1908 he married Susan Dickerman who died some years ago. They had three children, two sons, one of whom was in the army and probably now retired, the other working

for oil companies building plants all over the world, he told me. The daughter, Stella, is Mrs. Warren Prescott now living in Yarmouthport on Cape Cod, and the report of Charles' death was contained in her letter of May 1 to Sherm Chase who promptly relayed it to me by phone. A note of sympathy has been sent to her for the class with thanks for informing us of Charles' death so promptly. . . . As these notes are being finished on May 10 comes a long-distance phone call from N.Y.C. from **Joe Santry's** secretary to let me know that Joe died in a Florida hospital May 9, and in the noon mail a letter from Chicago from the son of **Isa W. Kahn** to tell me that his dad had died April 20. Careers in the November notes, and so long for now. Marion and I hope that you are all having an enjoyable and relaxing summer. Drop us a card from somewhere.—**Edward B. Rowe**, Secretary-Treasurer, 11 Cushing Road, Wellesley Hills, Mass. 02181.

'07

I have corresponded with about 25% of the class who expect to attend our 60th Reunion the second week in June. For the information of the rest of the class I will give a short summary of what those attending will enjoy. Rooms in McCormick Hall, the new women's dormitory, have been assigned to '07; we also will eat our breakfasts there. Both rooms and breakfasts will be paid for by M.I.T. Due to the fact that a number of our class members cannot drive or reach Cambridge by themselves, due to poor eyesight or advancing years, the class officers have invited their wives to attend although this is contrary to all past votes of the class. Friday afternoon and evening are set for arrival and getting acquainted. Saturday a bus tour of the campus, the renewal districts of Boston, and the Prudential Bldg. are on the program. **James M. Barker** will be our host at our evening banquet at the Faculty Club which will be followed by a class meeting. Sunday for rest, visiting, Church attendance, etc. Monday, Alumni Day, will be entirely taken up with interesting meetings, lunch in the Great Court. In the evening a social hour, banquet and entertainment. Tuesday we depart for home. I hope happier and wiser. . . . A letter from Mrs. Anthony B. Arnold told of **Tony Arnold's** death on April 15, 1967. He was living at 538 Lawrence Ave., Westfield, N. J. I wrote Mrs. Arnold on behalf of the class and received a very nice letter of thanks and appreciation for the sympathy I had expressed. I have been unable to obtain an obituary notice. . . . **Ed Lee**, I, has moved again. This time from Everglades to Homestead, Fla. His new address is 15440 Harding Lane, Leisure City, Homestead, Fla. 33030. . . . The Alumni Association has notified me to remove the name of **Paul Frederick**, VI, from our class roll where he was carried as an Associate member. Neither the Association nor myself has any information about him. His last address was Sewickley, Pa. Can anyone help out on this? . . . In a

recent mailing I sent out letters to **Carroll S. Dean**, VI, Chevy Chase, Md., and **Thomas W. Roby**, I, which were returned for lack of a proper address. I have since learned that Tom Roby died during the summer of 1964. . . . A card from **Willis Waldo**, I, from the Canal Zone tells of his continued business activity in Latin America. Several times in our class notes I have reported **Stan Wires**, IV, as being on the point of retiring. He now is fully retired. His last big job was filling an order for 20,000 sq. feet of floor tile from Wales to be installed in the new Boston City Hall. Mrs. Wires died a short time ago. Stan is fortunate to have children, grandchildren and great grandchildren to visit with and enjoy. . . . **M. E. MacGregor**, VIII, writes me that he is very much alive and in excellent health, although someone notified the Boston Retirement Board of his decease. He recently bowled 336 for three strings in the Candlepin League at Orleans, Mass. Quite a record for a "dead" man. . . . I had a letter from **George Griffin**, I, from his home at Woods Hole, Mass. He expressed his regrets at not being able to attend the Reunion due to his physical condition and to a very restricted diet that he lives under. Anyone going to the Cape should stop and visit with George. I have done so each fall for many years now.—**Philip B. Walker**, Secretary and Treasurer, 18 Summit Street, Whitinsville, Mass.; **Gardner S. Gould**, Assistant Secretary, 409 Highland Street, Newtonville, Mass.

'08

Next year we celebrate our 60th. Please make your plans to be with us. Best wishes for a happy summer.—**H. L. Carter**, Secretary, 14 Roslyn Road, Waban, Mass. 02167; **Joseph W. Wattles**, Treasurer, 26 Bullard Road, Weston, Mass. 02193.

'09

When Muriel and your Secretary returned on April 17 from a short trip to Florida, it was a great shock to find a notice from the Alumni Office telling of Molly's death on April 6 (at the age of 79). We could hardly believe the news for he always appeared to be in good health and within a short time we had received correspondence from him relative to class matters. More information was received in a letter from his son Sam as follows: "I have to report to you the very bad news of the death of **Maurice R. Scharff**, your classmate and my father. He was stricken quite suddenly early in the morning of April 6 and died within a few minutes. There had been no advance warning whatever. He had been as active as always in his consulting practice; he left work in progress for several clients. While I am sure that this is how he wanted to go, I am afraid that we have all suffered an irreparable loss. He was a distinguished engineer and a loyal and

active supporter of the Institute and of the class of '09; but he is gone." We immediately wrote to both Sam and Jeanne expressing the sympathy of the class as well as our own, and stating that he was our first Class President when we were freshmen in 1905-6, and had been our alumni Vice-president until the death in 1957 of Jim Critchitt when Molly was elected President. All through his alumni career he continued his interest and support of both the Institute and the class, and he has been of inestimable assistance in the planning and conduct of class activities, particularly our several reunions held during recent years. We all remember him as our President leading the class in the commencement parade and exercises during our 50th Reunion. As Sam states, "we have all suffered an irreparable loss." Molly was born in Natchez, Miss., in 1888 and prepared for the Institute at Phillips Exeter Academy. While at the Institute he was engaged in so many activities and held so many important offices space permits mentioning only a few, such as manager and captain of the tug-of-war team, editor of *The Tech*, business manager of *Technique*, assistant manager of the Musical Clubs, Institute Committee, Class Day Committee, and First Marshall on Class Day. Molly's career as an engineer has been a most distinguished one. During the last World War he held important positions in Washington, one being with the Coast Guard Economic Division. He has been an engineer and consultant in many important power developments not only in the United States but in other parts of the world. When Muriel and your Secretary were in Portugal in 1951, we visited an important hydroelectric development of which Molly had been a consultant. Molly's passing leaves the office of President vacant and a successor should be elected soon. We have written to **Tom Desmond**, our Vice-president, and this is part of his reply: "This is in reply to your courteous letter of April 27 commenting on the recent death which we all so greatly regret of our Class of 1909 President, Maurice R. Scharff. Of course, as Vice-president, I will gladly perform the duties of Acting President until a new Class of 1909 President is elected. But, finally and definitely, I will not accept the office of 1909 President. Thomas C. Desmond has received M.I.T. honors enough and the honor of 1909 President should go now to someone else." This matter will have been discussed on Alumni Day and will probably be followed by a post-card ballot.

Shortly following the death of Molly a two-column obituary notice appeared in the Boston *Herald* of April 24 telling of the death of **F. Gardiner Perry** on April 23 at Bath, Maine, at the home of his daughter, at the age of 81. Gardiner was born in Dorchester in 1885, prepared for the Institute at the Waltham New Church School, was in Course VI, and performed his thesis with the late Lewis H. Johnson. Many will remember him as an officer in the M.I.T. Battalion. After graduation he became an assistant in electrical engineering. He soon joined the Babson Institute at Wellesley Hills with

which he was associated for 25 years. He was its first graduate and became president of Utopia College, a branch of the Babson Institute, in Eureka, Kan. During the past few years he served as business manager of the Perry Normal School in Boston, earlier operated by his mother, and became its first president and the chairman of its board of trustees. He was executive secretary of the Church of the New Jerusalem, a director of the New Church Theological School in Cambridge, and was president of the New Church Society. He leaves his wife, Helen (Whitehead), two sons, Frederick G., Jr., and John C., and a daughter, Mrs. Ernest Haskell, Jr., with whom he was visiting at the time of his death. We shall greatly miss Gardiner for he was one of our faithful members who maintained his interest in the class and the Institute and who was almost always with us on Alumni Day and at our Reunions. . . . During our trip to Florida we visited a son, Laurens, who is now the proprietor of two ironwork shops at West Palm Beach where everything from heavy steel girders and trusses to ornamental iron work is manufactured. At Sarasota we visited Miriam Nash, **John Davis'** sister, and her husband, Henry, '20, a former Harvard baseball captain. All four of us had a most pleasant visit with Betty and **Art Shaw** at their winter residence, the Ponderosa, on nearby Longboat Key. We have often written about the Shaws and Longboat Key and were most interested to see it. Their apartment is one of several in a large U-shaped motel having a beautiful tropical garden within the open U and a sandy beach nearby. Art looked the picture of health, but the trouble which bothered Betty on Alumni Day last year unfortunately still persists. . . . We received a short note from **Eliot Q. Adams** from Maple Heights, Ohio. He was worried about the health of the Secretary owing to the fact that no class notes had appeared in two recent numbers of the Review. We assured him as to our health, stating that dearth of news accounted for the omissions and hoped that he, as well as others, would help out. —**Chester L. Dawes**, Secretary, Pierce Hall, Harvard University, Cambridge, Mass.; **George E. Wallis**, Assistant Secretary, Wenham, Mass.

'10

I have received notice of the deaths of **Frank A. Scott**, **Ridgeway M. Gillis**, and **Thomas W. Saul**.

The Sacramento, Calif. newspaper had the following account concerning Ridgeway Gillis: "Gillis played a key role in shaping the California highway program. A specialist in construction and operations, Gillis served as district engineer at Fresno and as construction engineer in Sacramento during his early years with the division. In 1947 when the division expanded he was named assistant state highway engineer in charge of operations. This included supervision of construction, maintenance, equipment, materials and research. He was deputy highway

Happy Birthday

There are only 13 Honor Roll birthdays this month. Six alumni will be 85 and seven will be 80.

July, 1882—**JOHN J. MULLEN**, '08, on the 6th; **FRED W. GOLDTHWAIT**, '05, on the 8th; **WILLIAM A. SHELDON**, '06, on the 8th; **SILAS P. CUMMING**, '05, on the 11th; **EDWARD J. POOR**, '05, on the 15th; **ROGER P. INGALLS**, '05, on the 23rd.

July, 1887—**HAROLD H. HOWLAND**, '08, on the 2nd; **WALTER P. GREEN**, '12, on the 6th; **FRANZ SCHNEIDER**, '09, on the 11th; **JOHN W. BEAL**, '09, on the 12th; **BION A. BOWMAN**, '09, on the 19th; **FREDERICK A. DEWEY**, '10, on the 19th; **WILLIAM T. MAHONEY**, '09, on the 22nd.

engineer for five years before his retirement in 1955."

The following note concerning the death of Thomas W. Saul was received from Frank W. Sharman '08: "Thomas W. Saul, 80 died in Tucson, Arizona on April 6, 1967. He held the Distinguished Service Cross for Army service in W.W.II. He was a division engineer for the Southern Pacific Railroad in Tucson for 17 years until his retirement in 1955."

Carl H. Lovejoy writes: "After nearly ten years of retirement in Florida, I sold my house and bought an apartment in one of these condominium complexes that are springing up all around here. Some are vertical, many stories, this is horizontal, 43 acres, and yet right on U.S. #1, and intracoastal waterway. They all have swimming pools, and we have a half million dollar recreation building to make it sort of a kindergarten for old folks, or should I say adults only—no children, no pets.

"We hated to give up our house, but my wife has arthritis that keeps her in a wheelchair, and on advice of friends and children we made the move. Now that we are here we like it. Right on the waterway with boats of all sizes parading by our windows. One word of advice to any person coming to Florida—if he is our age—locate within walking distance of stores, bank, (oh yes—and hairdresser). We regret that trips north are no longer possible, but our children, and grandchildren, (some of them married) have visited us frequently and will continue to do so.

"I enjoy the Technology Review but many articles are beyond my comprehension. Engineers were trained in our day, now it is a genius that is graduated."

Early this month I had a call from **Allen Gould** saying he was in Boston. I invited him for luncheon as I thought it would be pleasant to have several of our classmates get together.

I called **Hal Manson** but he could not come due to the fact that he did not have his new eyeglasses. He had just had a successful operation for cataracts.

I called **Ralph Horne** and he was out of town. I called **George Lunt** and he accepted and the three of us had a pleasant luncheon together.—**Herbert S. Cleverdon**, Secretary, 120 Tremont Street, Boston, Mass.

'11

The following is the substance of an article in the *Arizona Republic* of Phoenix of April 2, and relates to some World War I exploits of **Mark Curtis Kinney** who spent the winter near Phoenix writing his memoirs which he hopes to have published as *I Flew a Camel*. After being turned down by the U. S. Air Force for medical reasons, Curtis joined the Royal Air Force and six months later turned up in France as a British Lieutenant flying a Sopwith Camel. Unlike Charlie Brown's "Snoopy," Curtis encountered the real Red Baron Manfred von Richthofen and describes his meeting as follows: "Suddenly right in front of me a Camel turned on its side and plummeted to earth leaving a trail of black smoke . . . Then I saw a bright red plane, the most terrifying thing I had seen in the air. I pointed the nose of my machine at the red devil and pressed my controls. Both machine guns opened up and I saw my tracer bullets going toward the fuselage of the red fighter." But at this critical moment, Kinney's Camel came under fire from von Richthofen's wing man. He spun to avoid the shells and by the time he regained the straight and level, the dog fight was over. His comment "You see I got shot up, never made captain, missed the Red Baron by a mile and didn't win my Distinguished Service Cross." That day the Red Baron shot down Kinney's squadron commander, Maj. Raymond Barker and Lt. D. G. Lewis, his 79th and 80th kills and his last as he was himself shot down the next day. . . . I had a nice letter from **Aleck Yereance** early in May telling of his trip from Virginia to his summer home in South Harwich on Cape Cod, where he shares a house during the summer months with his daughter and her family. He enclosed two clippings. One had to do with the Massachusetts man who created the statue of Lincoln in the Memorial in Washington. The other gave quotations from a talk by **Luis de Florez** a number of years ago predicting things in space exploration that have since come to pass.—**Oberlin S. Clark**, Secretary, 50 Leonard Rd., North Weymouth, Mass. 02191

'12

Word has just been received of the death of **Dr. John P. Minton**, at Grand Junction, Colo. on February 20th. **Dr. Jerome C. Hunsaker**, Professor Emeritus of the Department of Aeronautical Engineering has recently been elected to the National Academy of Engineering. The National Academy is a private organization which advises the Federal government on matters of science and technology.

Jim Cook has made four trips to Winnesquam, N.H., fishing for landlocked salmon. No results so far except snow and cold weather. . . . **Harold Brackett** moved from Florida to his summer home at the old farm in Limerick, Me. . . . **Randall Cremer** may now be

reached at Ses Voltes, Blanques, Genoa Palma, Mallorca, Spain.

Henry C. Dunbar is now located at 9525 Thanksgiving Avenue, Miami, Fla. 33157. —**Frederick J. Shepard, Jr.**, Secretary, 31 Chestnut Street, Boston, Mass. 02108. **John Noyes**, Assistant Secretary, 3326 Shorecrest Drive, Dallas, Tex. 10145.

'13

When you read these notes, it will be less than a year before we shall celebrate our 55th Reunion. Are you making plans to join us at Oyster Harbor Club? Once again **Marion Rice Hart** makes publicity by appearing on the television show "To Tell the Truth," moderated by Bud Collier with his panel: Tom Poston, Peggy Cass (a Boston girl), Orson Bean (a boy from Vt.), and Bess Myerson. Three of the panel voted that Marion was telling the truth regarding her solo flight from this country to Scotland in her private plane. . . . We received a clipping from the Alumni Association which briefly stated "**Daniel Ricker**, retired head of the Technical Service Div. of the Electric and Steam Sales Department of Boston Edison, passed on recently. He was a graduate of M.I.T., joined Edison in 1920 and retired in 1955. Dan graduated with a SB degree in architecture in 1913. We all enjoyed Dan and his lovely wife at our 50th. To Dan's family we extend our heartfelt sympathy. . . . Received a very nice note from Gene Bonney acknowledging our sympathy card in the name of the Class. She will shortly leave California and come back East to be near their children. Again, we return to Class Autobiography: **Allen F. Brewer**, P.O. Box # 518, Jensen Beach, Fla. 33457—wife Maurine McDonald Brewer; three children: Allen F. Jr., 45; John Francis, 39; Arthur Gordon, 42; a goodly number of grandchildren, 13—Sheryn Ann, 20; Terry, 18; Susan, 15; Krista, 14; James, 12; Scotty, 12; John, 14; Marion, 10; David, 13; Sean, 3; Douglas, 5; Tommy, 3; Teddy, 7. Allen's hobbies are stamp collecting, yard work, and editorial writing. He is one of our best correspondents; also he and Maurine are one of our most travelled couples. They visited old friends in Nassau, and the boys in Pennsylvania, Kentucky, and Maryland last year, and this year will extend their territory to Fort Worth, Texas, and then to Montreal to see Expo 67, visiting in Kentucky as well as Pittsburgh, Yorktown Heights, and Braddocks Heights, Md. Then, in 1968, they will visit New England for our 55th and Yankee friends. Allen will have some old photos of 1913's activities at the 'Stute and it is suggested that we all dig deep and collect any photos, movies or other relics or reminders of our play-days and reunions which could be exhibited at the Fifty-fifth. Allen also reminds us that 68 countries in this world portray their waterfalls on their stamps, which involves 82 waterfalls. He will shortly record his research. Even though most of us suffer the ravages of old age, keep the news coming.

. . . **John B. MacNeill**, of 569 Ardmore Blvd., Pittsburgh, Pa. 15221 lives with his wife, Evelyn C. They have three children, and Paul G. is a graduate of 1967 at M.I.T. (Mgt. Eng.) Further he has seven grandchildren. **Mrs. Nathaniel McL. Sage** (Charlotte to you), lives at 233 Walnut St., Brookline 46, Mass. She writes that her activities are "keeping up with houses and occupants in Brookline and ditto in Vermont." Here's her list: "You asked for it—can't possibly remember ages." The list shows: five children—Mrs. M. S. Shakespere, Mrs. J. H. Case, N. McL. Sage, Jr., Mrs. Carl Barus, Mrs. G. A. Saxton, Jr; 12 grandchildren—Eliz. H. Case, J. McL. Case, Wm. H. Case, Anne McL. Sage, Jennifer Dup. Sage, Wm. L. Barus, Peter Barus, Maxwell Barus, Nathaniel McL. Saxton, Melinda H. Saxton, Holly K. Saxton, and G. O. Saxton. Also, three step grandchildren—(N. Sage, Sr.)—Carol Williams, (Mrs. T. H.), Eliz. Barker, and Timothy Barker. There are also three step great-grandchildren named Williams. Quite a family, so keep busy and come to the Reunion for a rest. . . . **Edgar W. Taft** resides at 138 Pawson Park Dr., Branford, Conn. 06405 (summer) and Tortgas Lane, Ft. Lauderdale, Fla. 32312 (winter), with his wife, Adelaide. They have four children, Edgar, Barrett, Caleb, and John; 12 grandchildren, Barrett, Scott, Elizabeth, Cyrus, Sarah, Peter, David, Pamela, Cary, Janet, Russell, and Judith. No great-grandchildren. **Gordon G. Howie** lives with his wife Ethel at 1421 South Betty Lane, Clearwater, Fla. 33516. They have three children, Mr. Malcom P. Howie, Dr. Donald L. Howie, and Miss Laura C. Howie; and three grandchildren, Douglas P. Howie, Bruce G. Howie, and Lynn Marie Howie; a step grandchild, Mrs. Joan Meyer, and also a step great-grandchild, Charles Meyer. Gordon states, "Company affiliations are somewhat reversed as compared to former days, i.e., instead of my being affiliated with the Company (Cambridge Gas Co.), it seems more like the Company is affiliated with me in a friendly way when the pension check arrives each month. My other affiliations are in "honorary" or "life membership" category, except when cutting the grass down here in Florida which the past summer was on a steady, routine, five day recurrence. This year for the first time in 27 years, we did not spend the summer on the shores of Maine, and frankly we could see the difference in temperature. Ethel joins me in hoping the Capens have had a good summer and are as peppy and happy as ever." Yes, Gordon, thank you. **Frederick H. Kennedy** with his wife Helen resides at 1304 Carew St., San Dimas, Calif. 91773; they have a daughter, Alice, 40, as well as five grandchildren—Mary, 14, Donald, 12, Kimberly, 11, Geoffrey, 9, and Robert, 6. Fred says he is on the San Dimas Planning Commission. He received an M.A. in history at the age of 70 from Claremont College Graduate School and is now writing a study of history. Good work, Fred. **George W. Bakeman** with his wife, Mollie, is hibernating at "The Oaks" in Hanover, Virginia. They have three children

all married—Kathleen, 46, Beryl, 43, and Margaret, 36. There are 10 grandchildren ranging from 1 to 21, but no great-grandchildren. George has not any affiliations, but has various hobbies: cabinet work and gardening. Nice going. The Capens are well, busy and happy. We know that any '13ers should stop in at "The Oaks" and we know as you state that you two will be delighted to see them. **John W. Ladd** states briefly that he and his wife, N. Constance, reside at 300 Seminole Ave., Palm Beach, Fla. 33480

Henry O. Glidden and his wife, Jane B., are residing at 49 Colonel Hunt Drive, Abington, Massachusetts, 02351. He has two children, Dorothy G. Newman, and Frances G. Johnson. There are four Newman grandchildren: Michael, 24, Dorothy, 21, Barbara, 20, Wendy, 7; three grandchildren named Johnson: Carolyn, 21, Andrea, 16, Donald, 14. Heinie adds, "Am still painting and exhibiting watercolors. Had a one-man show at North Quincy Branch of the Thomas Paine Public Library Nov. 14 to Dec. 19, 1966. Had a wonderful trip to the Canadian Rockies in August. Visited Glacier National Park in Montana and Paradise Inn at Mt. Ranier in Washington, and then Seattle. From there by bus up the mountains and to Lake Louise and Banff. All the Canadian cities we visited were booming. There is a tremendous lot of building going on up there and all seems to be very prosperous. By the way, at Portland, Ore., **Lindsley Hall**, who was partly '13 and partly '14 had dinner with us at the hotel. Any of the Course IV men would remember him. He went with the Metropolitan Museum of Art in New York after leaving the Institute and was in the Egyptology Section until he retired in 1959, I think it was. Had a wonderful interesting life, most of the time in Egypt at the Valley of the Kings, where a lot of archeological excavations were being made. Jane and I have been fine and greatly enjoying retirement." Will expect that you two will join us in 1968 at Oyster Harbor Club.

Well! this brings us to a close for the 1966-67 season. Next issue in November.—**Charles Thompson**, President; **William R. Mattson**, Vice-president; **Ellis W. Brewster**, Class Agent; **Eugene MacDonalld**, Estate Secretary; **George Philip Capen**, Secretary & Treasurer, 60 Everett Street, Canton, Mass. 02021.

'14

Not long ago we expressed curiosity about what may have happened to our Chinese classmates, Boxer students, after graduation and who are now listed as "presumed deceased." This prompted one of our schoolmates, William A. Sullivan, 1917, to come forth with an interesting story, both biographical and historical, concerning one whom he knew through business contacts in Shanghai which date back to the early '30s. "Dear Herman, I have read the inquiry about **Frank Yeh** in the class notes. I knew Frank very well. I regret very much to advise you that there is little hope that he is still

alive. In 1933-1937 I had the job of supervising construction for the U. S. Navy at Shanghai, China. At that time Frank was business manager at Kiangnan Docks, a very large industrial activity in the outskirts. Kiangnan did much of the repair work on U.S. ships which visited Shanghai, both commercial and naval. Frank was a Captain in the Construction Corps of the Chinese Navy. The profits at Kiangnan were used to support and to build up a Chinese navy for the establishment was owned by the Chinese government. Admiral P. T. Mar Chwyne, Navy M.I.T. '15, was in overall charge at the shipbuilding and repair activities at Kiangnan. I saw much of Frank at this period and he was often at our home. He was so jovial and full of life. He subscribed to "Whiz Bang" so as to keep in touch with American slang. He sometimes put on a Chinese gown and went aboard a U.S. naval ship where with a dead pan face he would astonish the crew with his perfect English pronunciations and his latest Whiz Bang vocabulary. I returned to Shanghai for a short time in 1947. Frank was back after spending the war years in the interior. He was in good spirits and hopeful of the future. I never saw him again. In 1952 I returned to the Orient and met some of my old friends from Shanghai who had escaped when the Communists took over and had settled in Taiwan. Frank was not among them. When the Nationalists occupied Shanghai, the Chinese Army had placed demolition charges around Kiangnan. The civilian workmen who lived at Kiangnan and who depended for their living upon the operations at the plant objected to any premature demolition. When the Nationalists withdrew—Frank Yeh remained behind. I could never understand just why. Anyway soon after the Communists took over Frank was arrested. This was an established fact. Later he was sent into the interior of China for trial before a peoples court. I think this fact was pretty well established. This in itself was really a cheater sentence. When the Communists sent anyone before a peoples court they took no chances that any witnesses might stand up in their defense. Hence, those charged before a peoples court were invariably sent for trial in some place where they were entirely unknown. For the purposes of the Communists this practice was quite necessary in the case of Frank Yeh. He was very popular with the civilian workmen at Kiangnan. He and P. T. Mar had done much to improve living and working conditions at Kiangnam. It was quite a model plant. Admiral Mar was one of those in Taiwan at this time. Privately he told me that he had information from the mainland that Frank had been executed (beheaded) after trial by a peoples court. Frank was a graduate of Phillips Andover. I had had an inquiry at the time from Andover about Frank. Admiral Mar asked me not to say anything about the fact that anyone in Taiwan had any positive information about Frank's execution. It might embarrass those who were getting information to Taiwan from the mainland. There was an M.I.T. club in Shanghai in the '30's. Once each winter

about 30 or more graduates would meet for dinner. I knew many quite well. When the Communists took over most of the M.I.T. graduates fled to other parts. Only a few I knew remained behind. For a few years information about those few now and then leaked out—but none of the information was encouraging. Of those that got away, many went to Taiwan where they contributed much to the development of that island. However, the years have taken their toll and I only know one old timer now alive and active in Tepeh. This is K. P. Ho, Class of '19 at Tech. In the '30's, K. P. lived in Chung King where he operated the West Czechow Development Corp. As regards Frank Yeh, there is no reason to believe he is still alive. Very truly, W. A. Sullivan, '17." . . . We are indeed grateful to Will Sullivan, albeit the tragic ending. . . . The reference to our Chinese classmates also evoked a response from our correspondent in Mexico and Pumpkin Lane who writes, "Dear Herman, Your note about our Chinese classmates was interesting and timely. But what has become of Z. Y. Chow, one time mayor of Canton, I believe, Turpin Hsi, and Techun Hsi? These are the ones I remember and I remember that Techun (or was it Turpin or both) treated me to a very excellent and authentic Chinese dinner in Boston Chinatown when we were students. I always think of that occasion whenever I have a Chinese meal. Incidentally it is not Quito, Ecuador; it is Quito; a beautiful spot near the equator, and I have not been able to figure out how one makes a sun dial that tells time at the equator. The books say that the gnomen should have the angle of the latitude in which it is used, that is for a horizontal dial, and for a vertical dial it should be the complement of the latitude. I am interested in vertical ones. The sundial, of course, always tells the correct sun time (clocks are a compromise). Sun dials and clocks agree only 4 days a year and these are not the equinoctial days! Besides the vertical dial I made for the south end of my barn I have seen only two others. One on the wall of an old church in Mexico and one on the far end of the Ponte Vecchio in Florence. (I wonder if it is still there?) Vertical sun dials make an interesting conversation piece, and they are convenient too. If any classmate wants to make one I will tell him how I solved some of the problems without the aid of spherical trig, which I never studied. Regards, Hom P.S. My dial tells daylight saving time!" We have answered **Homer**, giving some of our own experiences with sundials. I am sure that others have played with them. . . . And we also want to hasten to acknowledge the existence of Te Ping Hsi and Pauline who are citizens of the U.S.A. and who live in Lakewood, N.J., and who, as active members of 1914, attended our last reunion. Our Portuguese artist correspondent whose initials are A.H.W. expects to be back in the States early in May after some weeks abroad—several paintings completed in beautiful surroundings but the weather was cold and rainy. Now we know where the early spring weather came from in this country. . . . A note from **Paul Owen**

says: "Dear Herman, You certainly put me in a nice bright spot re: Our Cross and Brown Company calendars. I have had many telephone calls, letters and thank you's, but this was the first in a magazine. I sneak in a few to friends, not all for business. Several years ago we called on **Charlie Fiske**. I had planned a drive north to call on you but we ran out of time. Next time I am seeing you first and get some of that nice fresh air. Keep up the good news for 1914. Cordially, Paul." We hope to see you Paul, and if you feel strongly grateful for the plug, the Alumni Fund, as you know, could always use a little more.

A note from **Thorn Dickinson** is self explanatory: "Dear Herman, This summer I shall be hiding out again at Elk Lake Lodge, Blue Ridge, N.Y. 12870 commencing June 1 and ending October 21, if a bear don't eat me sooner. Sincerely, Thorn." O.K. Thorn but we don't like that last clause. Better come to a civilized country like Maine.

We received the following clipping from the New York Times of May 11, 1967: "**Warren Horton**, Expert on Sound, Ex-Aide of Navy Lab Dies, Electronics Specialist, New London, Conn., May 10 (AP)—Dr. J. Warren Horton, a pioneer in electronic communications, died yesterday in Lawrence Memorial Hospital. He was 77 years old.

Dr. Horton, who held many patents in the field, was technical director of the Navy's Underwater Sound Laboratory here for four years until his retirement in 1963. In 1927 he received the Best Research of the Year award from the American Institute of Electrical Engineers. He also held the Navy's Distinguished Civilian Service Award.

Dr. Horton, who has been called 'the father of sonar' came to the Underwater Sound Laboratory in 1941 as a special adviser to a division of the National Defense Research Committee. He became assistant director of the laboratory in 1945 and director in 1959.

The scientist was a native of Ipswich, Mass. He received a Bachelor of Science degree in electro-chemistry in 1914 from Massachusetts Institute of Technology and joined the technical staff of the Bell Telephone Laboratories in New York. During World War I, he was a navy technical expert at Nahant, Mass., and at naval headquarters in New London.

Back to Bell after the war, Dr. Horton headed a group that worked on the development of multiplex telephone and telegraph lines. He contributed to the development of loudspeakers and their application to radio broadcasting and sound films. Dr. Horton was in charge of development of electronic equipment used with the first system demonstrated by Bell in 1927.

Survivors include his widow, Adelina, and a son, Peter Horton of Santa Monica, Calif." We knew Warren very well and were close to him at the Bell Laboratories and later in his work on sonar at New London. Our sincere sympathy to Mrs. Horton and son.—**Herman A. Affel**, Secretary, Rome, Maine. Mail: RFD 2, Oakland, Maine 04963

'15

Congratulations to the fine Class of 1917 for their big, successful Fiftieth Reunion. All our Classmates who attended our Annual Class Cocktail Party and dinner at the M.I.T. Faculty Club on Alumni Day know what a gala party it was. The play by play description in AI's inimitable style will be in the November column. The Class Supreme—18 Classmates proved this again at a Class dinner at The Chemists' Club in New York on April 21. **Larry Landers** and **Bur Swain** again set this up and deserved and received a resounding hand of applause for their work and interest in making this such a successful and enjoyable Class evening. After a cocktail hour, the old Pirate, back again on the high seas after his surgery, opened the evening with a nostalgic and rousing "We are Happy." Larry and Bur outdid themselves proudly with the delicious dinner we enjoyed. Present were **Dick Bailey** and **Sol Schneider** from Philadelphia; **Jerry Goldwell**, **Ralph Hart**, **Joe Livermore**, **Bur Swain** and **Ray Walcott** from New York; **Stan Osborn** and **Larry Quirk** from Connecticut; **Ben Neal**, Lockport, N.Y., **Larry Landers**, **Horatio Lamson**, **Azel Mack**, **Archie Morrison**, **Pirate Rooney** and guest **Gerry Rooney**, **Wally Pike** and **Bill Smith** from Boston. The Connecticut contingent of Larry and Stan gave Ben Neal close competition for the long distance honors. Ralph Hart donated to the Class his brilliant 3-D slides of our Forty-Fifth Reunion with a special viewer. Many thanks, Ralph. These are available to any Classmate who wants to use them. Just write me. After dinner more than half the crowd adjourned to our comfortable headquarters upstairs for an evening of nostalgia, heightened by Joe Livermore's descriptions of some of his engineering projects in Latin America. Dick Bailey's stories were older and cornier than ever. In the absence of **Henry Daley** and **Speed Williams** there was no singing this year. We greatly missed these regulars—**Phil Alger**, **Larry Bailey**, **Henry Daley** and **Speed Williams**—who were all laid up in hospitals. **Alton Cook**, **Frank Parsons**, **Gil Peakes** and **Hank Marion** unfortunately could not be with us. **Sam Berke** wired his regrets but promised to be at the Boston dinner later. It was a pleasant, relaxing and friendly evening, typical of the wonderful spirit of closeness and camaraderie that makes our Class so outstanding. **Horatio Lamson** was a newcomer with the Boston group and we're sure he'll be a regular repeater. For us from Boston, it's become a regular celebration—the ride over and back together on the train, Friday night at the comfortable Chemists' Club and Saturday morning to sight-see in New York. This year we went to the top of the new and famous Pan-Am Building for a scary and spectacular view of upper Manhattan. Now for some news and notes from our widely scattered Classmates. **Lucius Bigelow**, Hynes Chemical Research Corporation, Durham, N.C.—"I am sending you a modest check, which I hope may 'help Azel' just a little bit. Here, things are

much the same as usual. I am still a resident consultant and am on hand week day afternoons for about one quarter of the time, which suits me all right. It is lots better to keep in some touch with advancing chemical progress than to use that old rocking chair too much. Last summer we took a short trip to Nova Scotia, where we had never been before, and it proved quite interesting. We passed through the nice looking towns of Pugwash, Tatamagouash, and also Durham, Nova Scotia—population 65. Then, after a week with the four grandchildren in Portland, Maine, and a visit with my old friends in Providence, I was about ready to repose somewhat. Only we ran into Boston to a wedding, where an old friend was taking his first plunge at age 65. Of course, I could not miss wishing him well. In addition, we met a man who now lives in Hawaii but who was just one of the boys on the street when we moved into the West End of Boston some 63 years ago. The meeting was most interesting. After all, it is only the first hundred years that are the hardest. I can scarcely realize that I'm now three-quarters of a century old—but what does that matter? I am greatly thankful that my wife is still doing fine and can drive well. As for me, well, it is surprising how much you can do with just a little vision if you just think you can. When I was at Tech I had only about 30 per cent and my present figure is strictly classified. At home I plug at my hobbies, including caning seated chairs and refinishing ancient grandfather clocks. Just now I have one reported to be 200 years old and could you believe it, it is ticking again! I do hope we both (and you, too) may have a good while more to tick. This supposedly humorous letter comes to bring to you, as ever, all my very best wishes for good health and good luck." **Ken Boynton** from his "Sagafjord" South Pacific cruise: "Our cruise was going fine until out of Samoa for Honolulu a salt water pipe broke and sprayed our generator, so we were without air conditioning when crossing the equator. We liked New Zealand, Tasmania, Australia, Rotoronga and Moorea. There were five M.I.T. men on board." A local paper here recently carried a fine picture of **Larry Landers** and his wife, Fannie, with a long, glowing story of the dedication of their splendid and generous gift of a new Radiographic Unit to the Beth Israel Hospital, Boston. Quoting—"The Landers Radiographical Unit will serve the Emergency Unit, the Health Service and the Outpatient Department, making it possible for the hospital to provide rapid diagnostic radiology service to the 20,000 patients annually who use the Emergency Unit. It will be used also for employee service. Elected a Trustee of Beth Israel Hospital in 1960, Mr. Landers has been a member of the personnel practices committee for several years and was one of the earliest contributors to the hospital's 1960 development campaign. Mrs. Landers is a Life Member of the Beth Israel Hospital Women's Auxiliary and has been active in its programs for many years." High praise to Fanny and Larry for their generous gift and loyal support of such a worthy cause. Here's Class devotion for you—**Joe Liver-**

more was unable to attend the actual New York dinner due to a previously dated, important business meeting. But he left that early and joined us at eight o'clock and we were delighted to see him and hear his experiences in foreign engineering work. Nice going, Joe. At last, age and his explorations in those weird Asian and South Pacific lands have caught up with **Ernie Loveland**. In April he struggled to get to Honolulu, where he had a serious, emergency operation for fractured discs in his back. Upon his recovery he left for a year of research in the Philippines under the direction of the Botany Department of the University of Hawaii. Then, he wrote, he will go to see a lot of Africa and West Europe. Maybe, we'll see him here, sometime—what a guy! . . . **Vince Maconi**, New Haven—"Marion and I have just returned from Florida. We started our winter vacation by taking a West Indies Cruise on the "Carmania," visiting ten islands and the Panama Canal Zone from Cristobal to Panama City. The last 3½ weeks were spent in polishing up our golf games. Our family is all well including the 10 grandchildren. Our oldest grandchild Richard, Jr. enters college this fall. I am still working the regular 40 hour week and will continue to do so as long as I feel well. Of course, time is taken out for golf and the usual short summer vacations. The new construction company Richard and I started about 3 years ago is doing extremely well. Lois' husband (John McClusky) is starting his 2nd year in pure art. His paintings are displayed in one of the larger N.Y. galleries. He originally devoted most of his time to commercial art. Norman accepted a new position with a Waterbury firm and is doing well. So everything goes well with the Macs. Give our best regards to Fran. Do not fail to call on us if you are down this way." . . . **Boots Malone** wrote from Sarasota that he had been in the hospital there for surgery. Hank Marion, Tuscon—"How time flies! It seems like just a little while ago that Virginia and I arrived here in Tucson and now it's almost time to go home. But it has been a gorgeous winter, the best winter that Arizona has had in many years. We've had day after day of gorgeous sunshine, with temperatures mostly in the upper eighties and the humidity has been as low as 7%. There has been no rain but they need it badly. We left home December 19 and expect to be back there about May 10. I am disappointed not to be home for the New York Class Dinner. Please say hello for me to all the gang and I know you will have a grand time. I hope you and Fran enjoyed your cruise to Brazil and Argentina. I wish I could have been along. Years ago, after I had been out of Tech only five or six years I worked on an assignment for a year in Rio and had a wonderful time down there. I hope the Pirate has fully recovered from his operation and is as good as ever and that you and all the boys are 'in the pink.' Virginia joins with me in sending our best to Fran and everybody." . . . Late in April **Doug McMurtrie** wrote from Orlando—"I am still here juicing those oranges and even have to climb the last tree for them, now. I am delighted to see the Pirate's name back on

the mast head!" When I received that on April 24, we had a big snow storm in Boston, ah, me! We're sorry to hear from **Frank Parsons** that his wife has been laid up a long time from an automobile accident last October. . . . **Bill Spencer**, Baltimore has been laid up with serious intestinal infection—"I came down with my attack about the time I received your card about 'Pirate.' I hope he is better and my best regards to all my dear classmates and girl friends. I am getting along nicely in my retirement. As engineering consultant, I go to my office about 4 days a week and keep in constant touch with four engineering societies and groups besides the Boy Scouts of America. So I find myself busy without the heavy pressure. Give my best regards to all the fellow classmates and friends and I look forward to seeing you all at an early date." . . . **Ray Stringfield** writes from Los Angeles—"I still don't know enough to retire. My son, Bob, who is carrying the load for me at our plant in Fullerton, has more sense and has just left with his wife for the Rotary International Convention at Nice, France. If the arthritis in my left knee were any worse, I wouldn't be able to walk around the convention anyway. Meanwhile I chased down to Yuma last week for a court case on a crazy tire accident, go to Lubbock next week on another one, have others coming up in Fresno and San Jose, Calif., and one in September in Winston-Salem, N.C., and fortunately just got back from sneaking a three-day weekend at our cabin at Desert Hot Springs where I did nothing more useful than reading the last copy of *Life* and a Perry Mason. Fortunately Johns-Manville in Boston is beginning to use quite a few of our Calder Coupling (Joints, Inc.) around New England, which helps to keep me from starving to death, and actually sales are increasing rather rapidly over the country so that I haven't even lost any weight. I trust that you are in equally good condition. Margaret sends her best to Fran. Better bring her out here again. Weather at Desert Hot Springs, sunny and 80°F; we can look up at Mt. San Geronio and Mt. San Jacinto which are still covered with snow." . . . **Ercell Teeson**, Southbridge, Mass.—"I have been retired nine years and have enjoyed every minute. I hope you are doing the same." Yes, Tees, I am—Speed Williams sends regrets for missing the New York dinner and regards to all Classmates. Our hospital list grows and to all our men now in or recently out of hospitals and those I don't know about, go our sincere wishes for speedy and complete recoveries and sound health in the future—**Phil Alger** (now back at the Mass. General Hospital), **Doug Baker**, Henry Daley, **Reggie Foster**, **Boots Malone**, The Pirate, **Bill Spencer**, **Eastie Weaver** and **Speed Williams**. Our Class was well represented at the March 27th meeting of the Alumni Association at the M.I.T. Faculty Club, when President Howard W. Johnson was the speaker. My report in the May column about the Pirate's surgery has aroused that old summer camp element in Course I, for, I have been deluged with corrections of that "Tarpaper" name we gave him. Some suggestions are—Transit Rod (typically Course I); Tinpan;

Tight Shoes; Twinkle Toes (oh, my!); Te-cumseh (yas, suh!); Tenderfoot (hardly), Tootsie (oh, my!); Tomcat (possibly); Tipperary (really Celtic); Teetotaler (hardly). Well, well, I never knew his popularity would stir up such a controversy. . . . A Herbert D. Swift Memorial is being planned by the New London (N.H.) Historical Society. The project will be the restoration of an historic barn as part of the Society's old New London reconstruction. When restored, the barn will be used to house antique farm equipment and early American tools and devices. A society spokesman said the project is believed appropriate "because of Swift's undying interest in mechanical engineering, machinery and gadgets. It was one of his dominant traits to be interested in how things worked and in explaining these matters to others." It is expected this will be opened as a museum this summer. Any Classmates who would like to make a gift for this Memorial may send a check to Mrs. William F. Kidder, Treasurer, New London, N.H. The Class Supreme—25 Classmates and guests proved this again at a Class dinner May 10, at the M.I.T. Faculty Club. Another enthusiastic, lively and enjoyable meeting opened with the Old Pirate, lean, lithe, and lethal as ever leading a rousing and nostalgic "We Are Happy" cheer. Cocktails and a delicious Bill Morrison dinner of a special "cordon bleu" chicken put us all in a pleasant and comfortable mood. We had the great pleasure and honor of having a distinguished guest in Ralph Runels, 1911, who came down from Lowell with Reggie Foster. He was enthusiastically welcomed and was a great addition to the evening. He is **Chet Runel's** brother and we hope he will be with us regularly. Absentees we missed were **Sam Berke**, **Bill Brackett**, **Wayne Bradley**, **John Dalton** (Providence), **Larry Landers**, **Ben Neal**, **Louie Young**, **Max Woythaler**, **Gene Eisenberg** 1943, **Jim Hoey** 1943 and **David Hamburg**. Max sent regards on a card from Interlaken, Switzerland. We missed them all. Present at the dinner were—**Larry Bailey**, **Whit Brown**, **Jack Dalton**, **Ray De Lano**, **Clive Lacy**, **Reggie Foster** and guest **Ralph Runels** 1911, **Horatio Lamson**, **Azel Mack**, **Archie Morrison**, **Frank Murphy**, **Harry Murphy**, **Charlie Norton**, **Stan Osborn**, **Wally Pike**. The Pirate with guests **Gerry Rooney** and **Joe deMarco**, **Al Sampson**, **Jac Sindler**, **Bill Smith**, **Fred Waters**, **Pop Wood**, **Bill Sheils** and **Herb Eisenberg**, 1952. This was Horatio Lamson's first Class dinner. We were all glad to see him and know he will now be a regular with us. Our younger members were as welcome as ever. The long distance competition was as close as ever—**Larry** and **Ray**, **Duxbury**; **Whit**, **Concord** (Mass.); **Harry**, **Hingham**; **Charlie** walked on the waters from **Martha's Vineyard**; **Al**, **Beverly**; **Archie** and **Fred**, **Marblehead**; and the winners **Pop Wood**, **Peterboro**, N.H., and **Stan Osborn**, **Hartford**, Conn. A fine crowd of Classmates and friends who bear out so forcefully the remarkable friendship and camaraderie in this splendid Class of ours. Long may it wave; **Stan Osborn** held forth about the honor he has in possessing one of the few diplomas signed by two outstanding

college Presidents—Dr. MacLaurin of M.I.T. and Dr. Lowell of Harvard. Al spoke briefly of his plans for us to enjoy his and Barbara's annual Class Cocktail Party and dinner. Jack closed the evening with some touching and stirring words on our magnificent class. Someone has suggested a new name for the old Pirate—Buck N. Ear, what next? Our Class is deeply saddened by the loss of several prominent and popular Classmates. **Herb Anderson** died March 28 in Prospectville, Pa. Since his severe eye operation a few years ago, Herb had been in failing health. As an officer and director in a number of industrial organizations and banks, Herb had continued to be active in business, although retired since 1964. He gave a good deal of time and interest to civic and community affairs. **Alan Dana** died April 28 at the Yale-New Haven Hospital. As chief engineer for the Kerite Co. for 42 years, he held many patents on the design and construction of electric cables and published many papers in the wire and cable trade journals. He was a member and fellow of several electrical engineering associations and had received many awards and honors for this important work. He had travelled extensively in Mexico and South America and was an authority on the photography of Mayan Temples. **W. Findlay Downs** died April 25 at Gloucester, Mass. He had been president of Day & Zimmerman, an engineering firm in Philadelphia and was an officer and director in a number of business, banking and social organizations. He graduated from Lafayette College in 1910 and then entered our Class. **Johnnie O'Brien** died April 20 in Burlington, Mass. He had been in poor health for a long time. Johnnie prepared at Exeter and will be remembered as the spark-plug of our Class football teams. Where possible, Class representatives attended services for these men. Expressions of sympathy were sent to the families of each man. These are hard losses to take—we'll miss these men but will always remember them. So, here endeth the column for this year, with friendly wishes for you all and your families to enjoy a healthy and happy summer and with my profound thanks to every one for all you've done to "help Azel."—**Azel W. Mack**, Class Secretary, 100 Memorial Drive, Cambridge, Mass. 02142

'16

Now that the 51st has come and gone, about all our buoyant still-skiing president, **Ralph Fletcher**, can say is, "Good for you," if you were there and, "You'll never really know what you missed," if you weren't. And believing that the old-fashioned "ladies first" still applies today, we start off with a message from **Elsa Mueser**. She says she and Ed spent a number of weeks in Morocco, Algeria, Tunisia and Libya "following old Roman paths and changing our ideas about Arab civilization! Women count for little, still veiled—men dressed in comfortable burnoose, in Libya in old Roman togas. How little understanding we citizens have of other peoples! What marvelous builders

and engineers the old craftsmen were! What beautiful hand cut mosaics! We are among the first Americans to cross the north of Africa, and I think we are the luckiest of humans and spoiled as to food, climate, methods of travel, and above all in clean cold water and pleasant hot water." Call Elsa in Mountain Lakes, N.J., if you want to know how to go about such a trip. . . . Going back to the 51st Reunion, here are some of the "sorry, can't make it" replies we had near the end of April: "Shall be in Europe at the time. Sorry," from **Walt Binger**. "We will be in Europe June 1 through July 15," from **Wes Blank**. "California too far from Massachusetts," from **Buck Bucknam**. "Most unlikely," says **Art Caldwell**. "This is my year to preside at Transylvania," writes **Dina Coleman**. "Remember me to all, and come and see me," says **Del DeLabarre** (Walsh Home, 420 E. 59 St., N.Y.C.) "Sorry, but will try to make the 55th; the 50th was a lifetime joy," from **Elbridge Devine**. "Commencement here is same time and my job too busy to get away, says **Victor Dunbar**. "M and I are in health and wish we could see and talk with you all. Luck and best wishes, '16," from **Marcel Gillis**. "Regret," from **Rudi Gruber** who will be in Germany. "It's a long, long way to Chatham from Colorado," writes **George Hale**. "Sorry," from **Saul Hoffman** and "Sorry we can't make it," from **Ted Jewett**. "Sorry we can't do these nice gatherings every year," **Lee Jones**. And so on and so on with "sorry's" and "in Europe's" and "best-regards-to-all's" from many more. And **Willard Brown**, our 50th photographer, can't make it because of an illumination conference conflict, but he did have some news for us. He was happily married on March 17 to a good friend of his school days and is well-settled in a new house in Santa Barbara. He writes: "Wonderful climate here. Our house is about half way up from the sea toward the mountains that give S.B. its real 'color.' Sun shines all morning in our patio, with 35 feet covered—a lawn, and then really exotic planting and utterly private. And the people are as different from those in (censored) as day is from night." And for our records and Mary Barker's records we now have another Dorothy.

In April a card from Hawaii bore the message: "The trip continues to be exciting. Pago Pago yesterday. Now en route to Honolulu 3000 miles away. Distances mean nothing out here. Bright sunshine but rough water today." Sure enough, it was from the **Steve Brophy's**. And a few weeks later came Steve's homecoming message: "No special news other than the development of a great enthusiasm for Australia and New Zealand. We may go back next year! The South Pacific islands are lovely as we have always heard." . . . The April 29 issue of the *Times-Picayune* of New Orleans had pictures of three fine looking engineers cited for outstanding achievement by the Louisiana Engineering Society at its spring convention. Already you have probably guessed who one of them was. You are right! It was **Vert Young**. He received the A.B. Patterson Award for "an outstanding record by a professional engineer in management." And now read this most interesting ac-

count: "Young came to Louisiana in 1937, and in 1938 was executive vice-president of Gaylord Container Corporation. He served as resident manager at the pulp and paper mill in Bogalusa and as manager of Gaylord land and timber operations in the entire South, later being elected director and member of the executive committee of Gaylord. When Gaylord merged with Crown Zellerbach in 1955, Young served as vice-president of the firm until retirement in 1958 and as a member of the board of directors until 1965. The award cited his 'outstanding management skills and his energetic program of planting on cutover Gaylord Container lands of over 150 million pine trees and placing 500,000 acres of forest land under intensive land management skills.' We are glad to see Vert's story all in one place. Congratulations Vert! . . . And we have another clipping of importance to 1916, this one from **Jap Carr**, the April 5 issue of the *Palm Beach Post*. It is some more about the out-of-this-world doings of **Frank Ross**. Here's what it says (headline): "Naples Senior Has a Great Day." Then: "**Frank Ross**, a 71-year-old senior golfer from Naples, Fla., had a couple of reasons to be happy about his Wednesday. He walloped a 5-wood shot from a trap on the second hole of the PGA National Golf Club's East Course close enough to the pin to win a 20-hole match from Paul Sukenik of New Hudson, Mich., in the second round of the American Seniors match play championship. At a dinner Wednesday night he was honored by his fellow seniors with the Distinguished Senior Award, given annually to the tournament player on the basis of his devotion to senior golf and popularity. Ross won his match in a rather dramatic fashion. Sukenik was two up at the 7th, lost the 8th and ended the 9th one-up. Ross never caught up until the 16th where he squared it. They halved their way to the 20th where Ross came off with his fine 5-wood shot that put him in a winning position." Jap says he is sorry he did not see Frank due to the fact he himself was hip-deep in tennis guests at the time. . . . And we have another clipping, this from the April 25 *Boston Globe*, sent by Hazel Crosby, with a picture of two fine-looking youngsters holding Boston Pops programs. Hazel says: "How about this for the class scrap book! I wasn't sure of the children, but there in the dim background are two fairly recognizable friends of 1916. Rebecca and Sam are making the Boston Society Column early." The caption reads: "It's Pops time for just about everybody, and down from Bedford, N.H., for their introduction to the evening of music were Sam Fletcher and his sister Rebecca. Monday night marked the 82nd opening of the famous Symphony Hall concerts."

And now we have some travel news, the real **Irv McDaniel** kind, for Irv and Kay are off on another of their exploring trips, this time to the Philippines, Hong Kong and other familiar-to-them places in the Orient. As they leave the Philippines aboard the m/s *Sunnyville*, Irv has a number of running comments, each paragraph starting off with "Mabuhay," which he says means, like aloha, many

things including hello. He writes: "Ma-buhay. We didn't have many chances to sample native dishes. I do recommend Cafe Indonesia on Roxas Boulevard. Try their crab alimango (stuffed) and their soup sinigan—it will make you want to sin-a-gan (it must be the humidity, forgive me). But this soup has clams, prawns, crabs, everything in the way of seafood. The finest fish in the world is caught here—lapu-lapu. Finish it off with coconut candy—makapuro. Couldn't find any fresh coconut ice cream and they have never heard of a mango-steen sundae or a passion fruit sundae. Remember the Escolta Drug Store? War can be hell." Then: "We sailed after dinner and Roxas Blvd. was ablaze with neon lights. In the distance were the twinkling lights of Cavite. At my request the Captain sailed close to Sangley Point where we lived—the Wynkoops, the Hitchcocks, the Kennedys, and the Ike Yates. And is that a gleam of light that I see shining where Nellie's Shack must have been? Slowly we pass by and in the distance such a glare of light, the heavens are illuminated; hundreds of men are yelling and beating the water with the tops of their paddles. At least fishing has not changed. Mariveles, where we saw the Pygmies; Bataan; and then Corregidor." Our visit was most satisfying. It brought back millions of memories we had almost forgotten. And how the Filipino has improved his way of life. Education and hard work are the main factors. But compared with the British, French and Dutch, we must give the U.S.A. tremendous credit for this improvement. The guidance and example for 40 years, our counseling and financial aid have all paid dividends many, many times over. It is still one place where Americans are wanted and are loved. Let us hope Washington doesn't mess this one up. And in comparison, it shows our democratic form of government is the best!" Again, later, after Hong Kong, aboard ship: "Most of the crew are Norwegian with the exception of about eight Chinese. Our steward is Chinese, Po Hok, who was born in Shanghai, raised in Canton and escaped to Hong Kong and got a job on this ship 17 years ago where he has been ever since. He was one of the world's best soccer players, and still is at the age of 57. Our salon is filled with cups and trophies that he has won. The food is so excellent I asked Po Hok if the ship's officers had the same chow. 'No,' he said, 'they have an entirely different menu except when there are no passengers. Then they have the same menu.' Now I understand perfectly." Speaking of his visit in Hong Kong, he said: "The next morning was spent solely in shopping, ordering things for when we return next month. Prices were much higher here too. In the afternoon we hired a car and took a four-hour trip into the New Territories. This is one of the few things we had never done; everyone likes it and it shows a rural China we used to know. Life here is very primitive, and I kept remembering Pearl Buck's *The Good Earth* and also *Oil for the Lamps of China*. It is all farmlands and mainly rice. But their fruits, vegetables and flowers are superb. They formerly had a water shortage but now

get their water from Red China, and they have more than they need. I was surprised to see how much ginger was grown. Then there are large pig and duck farms. They use water buffalo for their heavy work. The men and women wear most unusual shaped hats and several claim to be over 100 years old. We drove to a hilltop where we could look down on Red China, then back along the coast where fishing is the main occupation. What they eat may be of interest. They eat dog meat, the same as the Igoroto Indians, except that it has to be a puppy, six months or younger. If it is over six months old, it is illegal. They also enjoy raw monkey brains and snakes. Every Tuesday noon they ate (censored by Secretary). We went past an old walled city and then came to a large city where most of the refugees are located. There are about 2,000,000 refugees and Hong Kong has done a splendid job for them in providing food, housing and work. But the housing is very critical. There are hundreds of high-rise apartment houses; the rooms are ten by twelve feet and four or five live in each room. It usually isn't too bad because they know each other before they move in. They have excellent schools and playgrounds for the children, but the rents are excessive for them, I think. The British are to be congratulated. Well done!" We hope next to have what Irv calls a "story" for he and Kay are about to take a trek through Bukit Mertajam, Parit Buntar, Taiping, Ipoh, Bata Gajah and more. Watch for the next Irv-and-Kay installments in November and December.

We asked **Peb Stone** for some highlights of his and Dolly's Caribbean trip this spring and where to go and why. He comes back brightly with: "Barbados—a police tattoo, big show of horsemanship, reenactment of incidents in the life of Sam Lord, buccaneer whose 'Castle' is now a very nice tourist place to stay; St. Lucia—yacht haven where part of the movie *Dr. Doolittle* was taken, scheduled for release in November I think. We had Rex Harrison's cottage, got pics of some of the props, a 20-foot snail shell (plastic) and an old-time schooner, the *Flounder*. St. Vincents—Young Island: general host and attendants, swell bunch; good snorkeling, many animals including Mary the Lamb, Breadfruit Blye the parrot, Booby birds, turtle pen, crawfish pen, parakeets (in cages), etc., etc., good food mostly native, good entertainment native, and altogether a delightful place. Bequia, the Northernmost of the Grenadines—Anthony Eden's hideaway, now for sale, good two-hour sail over from St. Vincents, still has a whaling industry which we didn't visit. Must stop now and get grandson a haircut." There you have it—if you want more details, write Peb at 34-16 85th St., Jackson Heights, N.Y.

Bob Burnap wrote in April from So. Orange, N.J., that the most significant item that had occurred to him was that he had been on jury duty for the past two weeks without being called on to sit on a case. "Yes, my name was drawn frequently, but either the case was settled before the jury was chosen or my age, appearance, background, or something was distasteful to one side or the other so that I

was promptly excused once I reached one of the comfortably padded chairs in the jury box. The thing I am impressed with every time I am called for jury duty is what a cumbersome, manpower wasting procedure trial by jury is. I noted however on this stint that the court was experimenting with 6-man juries for certain civil cases. So perhaps we can hope for some eventual improvement."

Tom McSweeney of Hingham says he finds the "do it yourself" request outline hard to resist and writes thus: "Doing: I've been working at my trade, in Virginia, Oregon and several in-between points. Where been: Margaret and I had a most enjoyable European vacation during the winter. We spent some time in Madeira—if you haven't seen it we would recommend it most highly. Children doing: The children and their children are as usual. Three of the grandchildren are in college, which must mean that time is catching up with their grandfather. Philosophy: I'll have to take a rain check—I'll leave that to you." . . . And **Frank Hastie** answers the questionnaire this way: "Doing: Weeding my garden, especially the strawberry bed and the raspberry spread; bridge and poker. Where been: Between Dowell and Washington, D.C. Seen: Neighbors, bridge and poker players. Children doing: Frank Jr. (M/Sgt. 30 Artillery) is in South Vietnam. He could use the items listed during W.W. I, by the guy who wrote 'I've never seen a purple cow, etc.' as desirable GI equipment. Neal's heart is still bleeding for negro rights. Clem is with Standard Oil of New Jersey. Cora is taking post graduate work at Bryn Mawr in sociology. Philosophy: Don't stay when you're beat in sight." . . . A welcome note from Frank Davis, '04, in April read: "Enclosed is a clipping from the *Detroit Free Press* about the father of **Tredick Hine**, Class of 1916. Thought that you might like it for your Technology Review class news." Yes indeed, and here is the caption under the picture: "Full of Spirit at 103. Five score and four years of living haven't dampened the spirits of William E. Hine who is preparing to celebrate his 104th birthday on April 25. A native of New Milford, Conn., he retired at the age of 90 as city assessor at new Britain, Conn., having retired 11 years before that as a real estate agent and home builder. Mr. Hine was honored Monday by the Senior Men's Group of St. John's Episcopal Church of Royal Oak, where he is a regular attendant." And **Jim Evans** forwarded a like clipping that **Phil Baker** sent to him. . . . **Allen Giles** retired in October after 31 years as chief engineer of Longwood Towers in Brookline. Now he has hung out his shingle as a consulting engineer and finds his time considerably more flexible, permitting all kinds of extracurricular activities. His daughter Dorothy is currently working on a doctorate in classics major at Harvard, and son Allen Jr. continues as director of the Villa Maria College of Music in Buffalo. The fact that six grandchildren are all headed for college leads to Allen's "bit of philosophy" which goes like this: "I think we all agree that education is a fine thing as a preparation for living, and we all admit that our classmates were

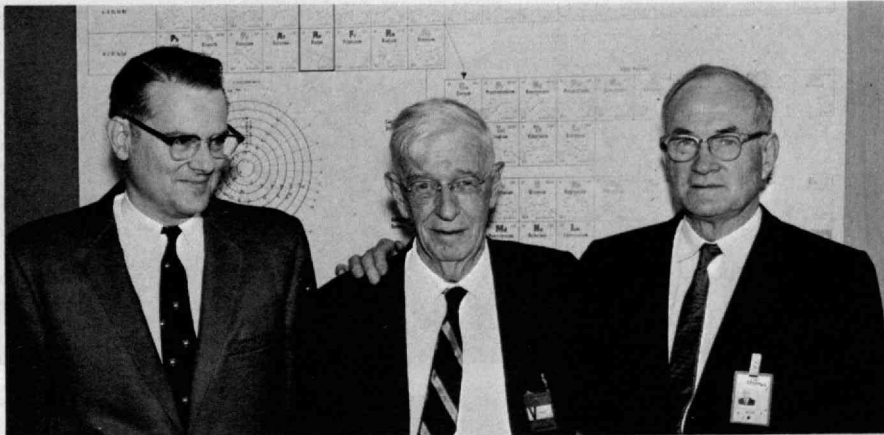
especially wise to choose the Class of '16 M.I.T. to acquire that preparation." . . . We will close with a comforting line or two from **Lewis Dow** in Odessa, Fla.: "While trying to write this brief letter I find myself looking out the window where the birds are eating and singing. It seems to me that the birds are made for retirement years when age has taken man off his feet and his feed and left him "sans smell, sans teeth, sans taste, etc." a "loaf of bread, a jug of wine, and thou—blue-bird." And finally, the best wishes of your class officers for a happy, healthful and restful summer and just the kind of vacation you have been looking for. Let us know where you are, wherever you are, and what you are doing, whatever you are doing, and so long until November—**Harold F. Dodge**, Secretary, 96 Briarcliff Road, Mountain Lakes, N.J. 07046

'17

Well, did everyone attending the 50th Reunion enjoy themselves? For those who did not attend, there will be a blow for blow description in the November issue. At least it is hoped that the Reunion was the "Best 50th Ever Attended"; we know that some have already reported attending where they previously graduated. Here is a picture of the senior **Edwin E. Aldrin**'s watching the space shot in which their son Buzz was a co-pilot. The *Sunday Star Ledger* of November 13, 1966, in part comments, "The Aldrins have been keeping a steady vigil over the progress of their astronaut son, Major Edwin E. Aldrin, Jr., since his lift-off in the Gemini 12 space flight Friday. There have been some anxious moments in the Aldrin home since the blast-off beginning with the

Edwin E. Aldrin, '17, Mrs. Aldrin, and Mrs. Madeline Sternberg, Mrs. Aldrin's sister, keeping their "steady vigil" over the television during Edwin E. Aldrin, Jr.'s ('63) Gemini 12 space flight.

PHOTO: HERB GRUBER FROM U.P.I.



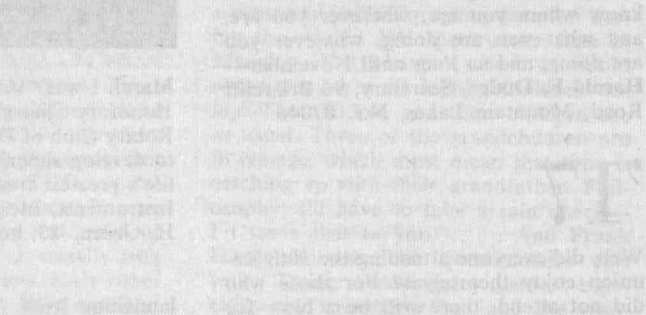
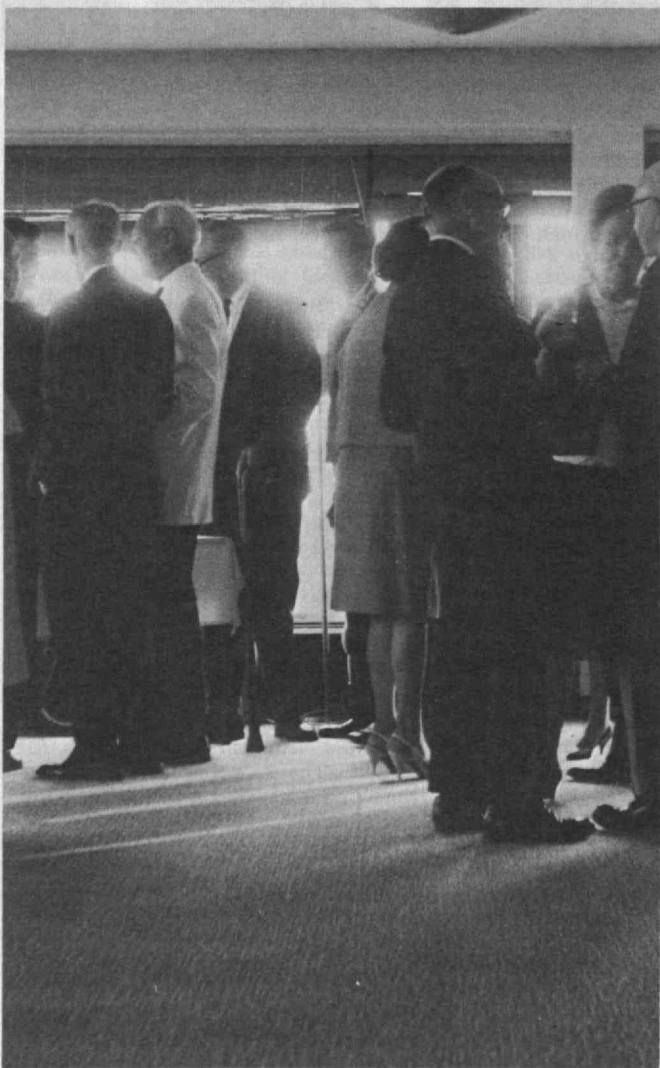
March 1 was "Vannevar Bush Day" in Dallas, when Dr. Bush ('16), who is Honorary Chairman of the M.I.T. Corporation, spoke to more than 600 members of the Rotary Club of Dallas and six other civic organizations at a joint meeting. "Freedom to develop superior methods of thinking," he told the Dallas audience, is perhaps life's greatest freedom. Earlier, Dr. Bush had visited the headquarters of Texas Instruments, Inc., in Dallas, where he posed for his picture (above) with Cecil H. Green, '23, honorary chairman of Geophysical Service, Inc.

launching itself. Tenseness turned to relief as the blast-off was successfully accomplished. Aldrin, Jr., a rookie in space but holder of a doctorate in space technology, was so calm that his heart rate slowed from 92 beats a minute at the start of the space stand to 75 as he went about his tasks." From the late *World Journal Telegram* of Saturday, February 11, 1967: "On the night the first mail was to be flown out of Newark the area was whipped by a blizzard like this week's. Joe Kelley had the first flight and kept watching the skies for a break in the storm. On one of his trips outside the hangar he felt an arm on his shoulder. It belonged to Col. Edwin E. Aldrin, Sr., airport boss. 'Son, don't take any chances. The Post Office can send the mail by train if it has to.' That's the sort of man Aldrin was, all class. Parenthetically, his sister-in-law, a society woman named Madeline Moon, was the first air stewardess for Eastern, just to prove it was safe. She had class too. Well, Aldrin had a young son, Ed Jr., who became friends with Carl Dolan, one of the survivors of the Lafayette Escadrille, that heroic band of aviators who fought the Kaiser's airmen with crates held together with spit and a promise. Dolan was a hero to the boy and was finally cajoled into autographing a picture, showing the flyer in high-collared uniform, puttees, and Sam Browne belt. Years went by, about 30 of them, and we fought a 2nd World War, one in Korea, and started the long process of conquering space. Young Buzz Aldrin forgot the yellow photograph, grew up, and became an astronaut. Last November he was one of two men who spent many hours orbiting the earth. Like other astronauts he had this quality I call class. About this time Ed Aldrin, Sr., ran into Carl Dolan, and they reminisced about the old times. As they parted Dolan pulled out a photograph, handed it to Aldrin and pleaded with him to get it autographed. The elder Aldrin looked at it. In 30 years the wheel had turned full cycle. It was a photograph of his son." Comments from

Ed Sr.: "Buzz graduated 3rd in his class at West Point in 1951, shot down two Migs in Korea, got a Commendation Medal for Commander of Alert Fighters in Germany, in 1958. He completed his doctorate in 1963. **Al Lunn** plans to make him honorary member of the 1917 Class. [Buzz has been assigned blazer #87, and I trust it was a good fit.] **Ray Brooks** and his committee interviewed Buzz in 1946 to go to M.I.T. and offered him a scholarship. He chose instead to go to West Point. We wish to acknowledge Harold F. Dodge, Secretary Class '16 who wrote November 1966: "Dear Ed, congratulations to you and Mrs. Aldrin for your son's wonderful performance! Cheers from 1916!"

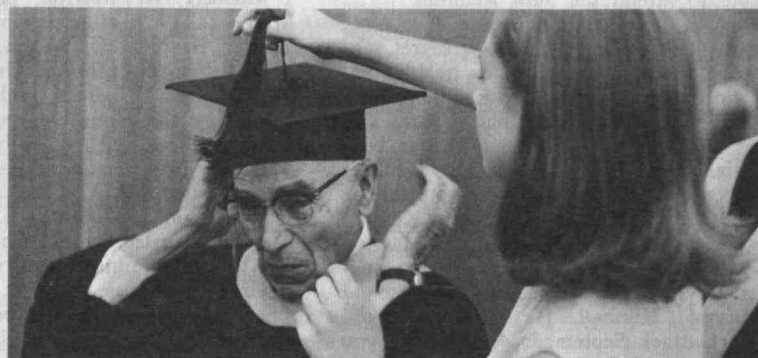
Harold Neumann of Des Moines, Iowa 50309: "Thanks for your personal and timely reminder that it is time for participating in the 1917 Class Fund for M.I.T. I have sent my check for this purpose as of today, March 31. I am having cataract problems, and I would not be wise to attend the Class Reunion at this time, perhaps next year, our 51st." . . . **Alex H. Kenigsberg**, 2109 West Linden Ave., Nashville, Tenn. 37212, also writes Ray Brooks, "Many thanks for your kind note. I have always felt I owed it to M.I.T. Intended to make it considerably larger but in the course of the last year there developed a nasty health situation in the family. Meanwhile, we are planning on the 50th Reunion so, Ray, you better be around as I will need a genial guide to introduce me to my classmates, most of whom have changed so radically I can barely recognize them from the pictures, even though some are Course I." . . . **Merrill C. Lee**, F.A.I.A. architect, writes from Richmond, Va., Southern States Bldg., 23219, to Ray Brooks, "I sincerely regret that I cannot do more in a big way for our wonderful school for it is a real pleasure to keep up with its activities. I have been architect for Medical College of Virginia, Randolph Macon College, and doing a 19-story women's dormitory and library for the

(Continued on page 94)

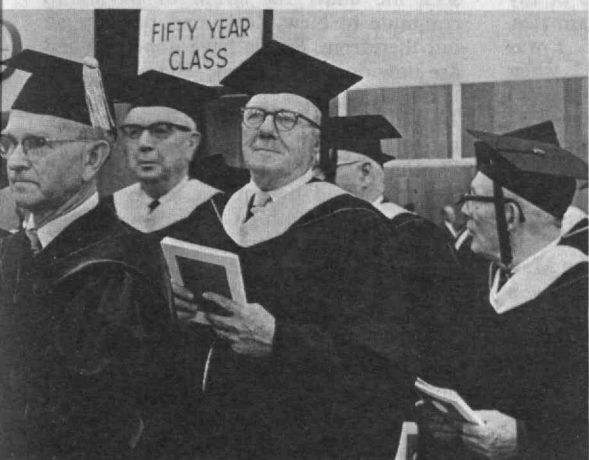


The M.I.T. campus, normally almost moribund on a June weekend, was enlivened on June 10 and 11 by formal and informal reunions of many kinds. The Class of 1928 had supper in the Student Center on June 11 (upper left) and made plans for a gala 40th reunion next year; the Class of 1907 had a quiet 60th reunion dinner (above) at the M.I.T. Faculty Club on June 10; while the McCormick Hall penthouse provided a breeze-swept setting with a nostalgic view for the Class of 1922 on June 11 (left) and the Class of 1912 on June 10 (below).





The 50-year Class of 1917 traditionally claims special honors on Alumni Weekend. The festivities began with a reception (above) in McCormick Hall on June 8; then came participation in M.I.T.'s Commencement, including a group picture on the steps of the Student Center in the hot June sun. And after two days on Cape Cod, the Class returned on June 11 for a garden party tendered by President and Mrs. Johnson (with a Mexican Mariachis group as added attraction) and to be guests of honor at the Alumni Day luncheon.



Richmond Professional Institute—really enjoying a fine practice. Regret I will be unable to attend our 50th Reunion. Just back from a month in Florida trying to recuperate from a junior pneumonia spell.”

Ted W. Burkhardt, 4099 S.W. Lowell Lane, Portland, Ore. 97201, “I retired from the American Can Company in 1957 and very glad to get out of the rat race. Am living in the family home in Portland with a beautiful view of the city and mountains and an acre of ground. Am doing a little work now and then for old friends who need help. Sorry will be unable to attend the 50th Reunion.” . . .

Joel W. Campbell, 623 Monte Vista Ave., Fort Collins, Colo. 80521, “I regret very much, because of my wife’s health, that I am unable to attend the Reunion. But I shall be glad to order a blazer if my size is still available.” (Blazer #97 has been assigned as March 1st was our deadline. For any minor alterations see your tailor). . . .

Mrs. Maxwell (Dorothy) Kimball writes as of April 24, 1967, 26 Marston Pl., Glen Ridge, N.J. 07028—“I am writing to tell you of the death of my husband **Maxwell Kimball**. He suffered a fatal heart attack September 4, 1966. As you may know his heart had given him trouble for some years. Will you, Ray, be so kind as to inform the class for me.” (Sorry Secretary did not receive this notice earlier, but herewith extend our sympathy). . . .

R. T. Whitney writes April 10, “I am kept busy with the job of pilot (president) of the Early & Pioneer Naval Aviators Association, better known as the Golden Eagles. Our membership comprises almost all of those left of the first 400 naval aviators, plus a growing number of distinguished later naval aviators. We now have 167 members and expect to have our 11th year reunion at NAS North Island, San Diego, Calif., July 26-29.” . . .

Mrs. Dean (Anne) Parker, who attended the 50th Reunion writes, “Leaving Dean’s best books at M.I.T. was my pleasure a few days ago. Our Chicago daughter phoned she was about to fly over to Massachusetts for interviews at Smith and other colleges, so I suddenly threw a bag in the car and the books were part of the pilgrimage.” . . .

Winthrop C. Swain, 4 Learth St., Hingham, Mass., comments, as of April 23, “I found the M.I.T. class letter of November 26, 1965, and there was your friendly note where have I been, etc., etc. Perhaps you will enjoy some of the enclosures, if not they may explain my somewhat dizzy condition at times. But maybe I am beginning to see some light and to practice constancy, etc., in everyday proceedings and not living so much in the clouds.” (It seems Win is still masterminding the market.) . . .

Lucas E. Schoonmaker, 800 S.W. 25th Place, Gainesville, Fla., “after 19 years of continuous and devoted service to teaching in the College of Engineering as associate professor of electrical engineering, retired in July of 1966. The 70-year-old professor has been associated with the University of Florida since 1947. Prior to his tenure he served as a career Army officer from 1917 to 1947 and attained the rank of Colonel. Colonel Schoonmaker is a member of the Institute of Electrical and

Electronics Engineers, American Association of University Professors, and served for one year as president of the Southeastern section of the American Society for Engineering Education, and for six years as secretary and treasurer. He has the distinction of being named ‘favorite prof.’ in the Seminole yearbook, and was presented as Knight Commander, order of the Orange Nassau, a title citation personally presented by Queen Wilhelmina of Holland. ‘Sir’ Lucas has four children and nine grandchildren, one grandson recently returned from service with the Marines in Vietnam.”

Adelbert R. Morton passed away March 24, 1967, after eight weeks in the Thayer Hospital in Waterville, Maine. Mrs. Esther N. Morton, Union, Maine 04862 writes, “He did so look forward to those New York luncheon meetings. I am sure we all realized that he had not been well for a long time, but he never wanted to miss attending. You ask about Bert’s interests from 1947 on. Well, that was the year he inherited the old Robbins home, and this became his greatest pleasure. He rewired the house and that was a job. Then the electricity had to be brought in underground. He loved the old place, and it was old. I found a birth certificate of one of his ancestors born there in 1799. He was so pleased to plan the ‘Golden Years,’ but this was not to be. I am so glad we had the wonderful trip in 1964 to Scandinavia and Austria. During those years Bert was in government projects; he had his professional engineer’s license too.” . . .

Joyce R. Kelly, 1938 Harris Ave., Richland, Wash. 99352, “Perhaps one of the most interesting facets of my experience, at least to my classmates, happened before I entered M.I.T. I was enrolled at Reed College in 1912 when Karl Compton was head of the Physics Department. For three years I served as his student assistant, thus began a warm and rewarding friendship which was broken only by his death. Upon my discharge from the Army in 1919 I was employed for four years by Western Electric Company. For 10 years I served the Metropolitan Life Insurance Company as a technical consultant to assist large Company group policy holders with their management problems. Shell Oil employed me in 1934 to prepare five floors of the new R.C.A. Building in New York for occupancy by five affiliated companies. Then I was transferred to St. Louis where for seven years I headed a group responsible for all U.S. tax returns. Due to severe losses abroad in 1939 Shell closed it’s St. Louis office, and not wishing to return to New York I resigned. From 1940-48 purchasing supervisor, mine laboratory U. S. Navy, purchasing agent, plumbing sub-contractor, Pentagon Building construction, then Ordinance Depot and Air Base, Reno, Nev. Then I moved to Portland, Ore., in 1943 and undertook the sale of personal real estate by building buildings thereon. I built and sold nine individual houses and 15 apartment units. Then I was employed by a company making aircraft subassemblies for the Navy; in 1948 I went with General Electric until my retirement in 1956. I had the major responsibility of supervision of de-

sign and construction of about \$350,000,-000 in process plants and other facilities. Retirement life seems even busier than prior thereto. There have also been assignments of a civic nature. When the A.E.C. in 1955 decided to discontinue its operation of the City of Richland, as an elected freeholder I was one of 15 to draft the City Charter and was elected chairman. I was elected a member of the first city council serving six years as councilman and four years as mayor of this city of 26,000.” Since writing this of Joyce we have learned of his sudden death on April 30.

Thanks to **Les Ford**, “I contacted **M. Thomas Green**’s widow who said she was much amiss in not announcing her husband’s passing. He did not graduate. He lived in Weston, Mass. My brother, **Wendell B. Ford**, has just established a home in Vero Beach, Fla., after about eight years of work in Iran and then the Philippines. He has written me that he cannot at this time come up to New England. I know he would like to see many of the fellows that he knew so well in the class. He has had a very interesting life in these areas and has much to tell about people and conditions, especially of old Persia.” (Let us hear from you Wendell.) . . . As of April 4, **Joe Littlefield**, 6080 S.W. 104th St., Kendall, Fla. 33156, “My whole family is as surprised as I am of our being down here. I can hear my son’s wife now saying, ‘Oh you will never get Joe to move!’ Then, when we got down here, ‘Oh he will be too comfortable in the house you have, you will never get him to build another!’ She is a nice girl, but has only seen me under the strain of having to commute to New York, and being worn out therefrom. So we have done one and are now doing the other. The only problem that may arise is that just before June 10 a crisis may arise. But I hope we can get to the Reunion. Doris is anxious too. She has her 20th at Hollins College in late May, and I want her to go to that. Maybe we will both go and just keep traveling north. The problem is two youngsters, now aged 7½ and 11½ and acting all ages from 4 to 15.” . . . Our good subreporter, **James Charles Flaherty**, advises that **Nelson Chase** has a commission to paint several scenes having to do with horse racing in the 1850’s. Anyone having such pictures should contact Nelson Chase at Hay Road, Belmont, Mass. Incidentally, one John Murphy, a lawyer of note, wonders if Jim has read *Art or Anarchy* by Huntington Hartford, as he feels Jim might be interested in what Hartford has to say.

Our honorary member, **J. R. Killian, Jr.** (since our 35th Reunion) as of his letter of April 18, “As I look at the schedule over the Reunion weekend, I am forced to the conclusion that I probably cannot participate in any part of the class program at the Chatham Bars Inn, but Liz and I do look forward to being present at the cocktail party on Sunday afternoon of the 11th at the President’s house. I am also sending in information on the class blazer because I would welcome the opportunity of wearing one. I would like to pay for mine. (**Loosh Hill** has your down payment so you will have to settle

that with him and Al Lunn.) I have so many good friends in the Class of 1917 and knowing too, as I do, of the exceptionally close ties that exist within the Class, I am looking forward with much pleasure to participating, even in a part-time manner, in the Reunion program."

... **Ray Brooks**, Class agent, 10 Blair Place, Summit, N.J. 07901, writes as of April 27, "I am still on tenderhooks as I have been for the last 9 to 10 months. Ruth is at a critical stage at Overlook Hospital and I am almost, but not quite, licked." (All we '17ers hope he made the annual meeting of the Northern Jersey M.I.T. Club to receive the "Award of the Year Citation," and then to our 50th.) ... At long last it is official that **Bob Erb** is the youngest member of the class. Thanks to the cooperation of Jim Flaherty we have a letter from **Bob Scannell**, architect, 125 Parkway Road, Bronxville, N.Y. 10708. Our 30th Anniversary report shows Bob Scannell's birth as being in 1899. However, he says it should read January 31, 1894. He further advises, "graduated from Princeton before coming to M.I.T. I probably would not have graduated from M.I.T. except I enlisted in May and was in France in early June, so I was excused from doing my thesis. At the moment I am busier than a cat on a tin roof, with much too much work for an old man of 73. I will definitely not be able to get to the glorious 50th, which I regret very much. I was able to get to Princeton's 1915 50th and had a swell time, although I was in charge of headquarters, which meant a lot of work and time." ... As of April 2 Bob Erb, "I got by my 70th very well." ... Your Secretary attended the last of the Harvard-M.I.T. Center gatherings May 3, at the Harvard Club, and was glad that **John Harper** and wife were present. John was also on hand the following day for the '17 luncheon at the Chemists Club. Also present Bob Erb, **Ken Richmond**, **Bill Neuberg**, **Enos Curtin**, **Dick Leongard**, **Bill Sullivan**, and **Dix Proctor**. Sully advises that he will shortly build his retirement home Rancho-Barnado in San Diego, Cal., presumably after he has disposed of his Snug Harbor at Beachwood, N.J. ... Our 50th year Reunion attendance, probably approximates 30% of the class which shows a lot can happen in 50 years. —**C. Dix Procter**, Secretary, P.O. Box 336, Lincoln Park, N.J. 07035, **Stanley C. Dunning**, Assistant Secretary, 1572 Massachusetts Ave., Cambridge, Mass. 02138

'18

Men have devised some amazing ways of preserving things. On the other hand, all history shouts that there is no turning back. From Tabor Cemetery Road in Muncie, Ind., **Karl Ford** writes, "When I left M.I.T., after helping Bill Hall with the proof of the revision of his book, I went to Washington on an industrial fellowship from the glass industry. As time went trundling along I was beginning to learn something about the properties of glass when an outbreak of botulism, which infected ripe olives bottled in California,

drafted me to work for the State Board of Health on specifications for processing nonacid foods. This precipitated me into the food industry from which, despite a couple of feeble attempts, I have never escaped. The thing that came to particularly concern me, over the lean and lively years, was preserving vegetables. As the representative of the glass container industry I travelled the deafening city thoroughfares and the hinterlands of America until I longed for a job close to home. This hope was almost completely realized near the end of World War II when I joined Ball Brothers Company in Muncie. This quickly developed into a project to develop and to promote a community program for the use of glass jars in home vegetable canning. A community cannery is a small plant where people prepare and pack their own food, to be processed by a trained retort operator. I had research, operating manuals, sales, and a training program to undertake, together with the development of equipment enabling a community cannery to use our jars in quantity without violating accepted standards for home canning. Then came convincing the State Boards which had outlawed, as hazardous, the use of glass in community canning. During the first demonstration I put on for a group of officials, not one of them would approach the retort until I removed a few jars and tossed them to one of the technicians. It was a challenge and a struggle. The job was interesting because it was a matter of ingenuity, heart, conscience and education. I have had a mountaineer show me, with pride, a jar of some old family specialty she had preserved for the first time in her life, and watched a family load a swag belled, ancient truck with gallons of apple butter, all produced in a short visit to the community cannery. On the more personal side, I was married in 1929 to Ethel Wilson, a Smith graduate, who majored in math and became a high school teacher. My wife gave me two fine children, both graduates of Purdue—a son who is with Foxboro Company, and a daughter who is such an active individual in all sorts of work beyond raising her children that I marvel at her energy. I visit my son at least once a year and spend part of the visit camping and climbing trails in the White Mountains, a recreation to which I introduced him years ago. Every other year he visits us in Muncie. My daughter's children are archers, and a trip to visit them in Minnesota includes hunting deer or out in a boat shooting carp. Ethel died several years ago, and I am remarried to a close friend of ours who lost her husband. We are settled just outside Muncie on a small acreage. In the back field are a few beef cattle; close to the house are flower and vegetable gardens, a small orchard, and a swimming pool. Chasing cattle, mending fences, maintaining a large yard of grass, flowers, shrubs, all in a respectable state, plus playing swimming instructor and life-guard, give me just enough physical activity to retain my belt line within recommended dimensions. I am granddad to my son's children (one boy and four girls), granddaddy to my daughter's children (two girls and four boys). I have two

stepsons and a stepdaughter living close to Muncie; the children of one son call me grandfather, but the son of the daughter (youngest of the step grandchildren) spends a lot of time with me, and calls me plain grampa. He has no consideration for my age and has me riding a bike, tramping fields, or some other activity calculated to keep me at least young-at-heart. I retired from active work several years ago but have been retained in a consulting capacity, which requires taking occasional field trips, participating in workshops, advising some group which wants to develop a new school community program, or conducting a survey as to the advisability of establishing a new canning center. I feel fortunate to have had the opportunity to keep active in a field which I enjoy. There are always new problems and new approaches to old problems, which make full retirement still seem far away. About two years ago I received a letter from Bill Plummer, who is retired and lives in Warrington, Florida, asking whether I was the Karl Ford who had saved his life when we were working in Bill Hall's laboratory. This recalled something I am still at a loss to understand. Bill and I had to turn the hydrogen sulphide generator on in the morning and off at the end of the day. Late one rainy afternoon I missed Bill and guessed that he had gone up alone to shut off the generator. When I got to the shack on the roof, I found him out cold with an open tube discharging gas. At the time I weighed about 117 pounds, and Bill stood at least a foot taller and weighed close to 200. Somehow I managed to drag him out to the fresh air—how I accomplished it still puzzles me. Bill also reminded me of the walking trip we took along the outboard coast of Cape Cod, starting at Provincetown. We dressed in old clothes with a few packages of dried food, plus a pan or two in which to prepare dehydrated soups. We stopped each night at the Coast Guard stations to sleep in the spare man's bed or in a sail loft. I have hiked in the White Mountains, the mountains of Virginia, and in North Carolina, but no trip can compare with that hastily organized jaunt which got us far away from that summer school laboratory session in the upper floor of the old Walker Building. I am finding life still worthwhile. The doctor finds little wrong with me, though I do experience some old age growing pains which kept me from the long hikes my grandchildren took last summer when we camped out near Lake Chocorua a bit north of where you live in New Hampshire."

From his home at 29 Foxchase Road Ext, Ashville, N.C., **Ned Longley** says, "I was truly touched by your kind words in the class notes regarding the Longley twins, and I want to thank you in behalf of Rob as well as of myself. We have both appreciated your cordial good friendship and admired your untiring devotion to the interests of the class. Echoing a thought in your letter of January 13, how unfortunate it has been that our graduation (what there was of it) saw us scatter to all points of the compass and lose the pleasures that could have been ours if we had seen more of each other over the

years. Under the stormy and tumultuous conditions of 1918 it couldn't have been otherwise, I suppose. Hjordes and I will be looking forward to seeing you and Carolyn at the big 50th. You being a stamp collector I am using two old commemoratives." [One was thirteen years old and even though cancelled, worth more than face value.] What a shame Rob wasn't married sooner, but there is no turning back. . . . First from his home at 11029 51st Ave. North, St. Petersburg, Fla., and then from the Bay Pines Veteran's Hospital, from whence he expects to emerge somewhat better preserved, **Sherman MacGregor** tells us, "I'm going into the local veterans hospital tomorrow for an operation which will, I hope, rearrange some interior plumbing that has reached the point where it needs attention. Nothing serious, but something I'll be glad to have fixed. About ten days ought to do it, I figure. I'll be glad to have it done before the hot summer days, because Bay Pines Hospital is not air conditioned in the wards, and it gets pretty hot in some of them when the sun is upon us in full force! Otherwise nothing spectacular. I've played in three shows this winter, a fair average for a season. The theatre still occupies my major attention, as it always has since I was a small child, and it gives me constant pleasure as well as keeping me on my toes in no uncertain terms! Wouldn't it be a good idea to add the addresses of the classmates who appear in the notes? For example, I was just reading about the Longley twins, whom I remember with such pleasure, and I'd like to drop Ned a note. And if you had given us his address, I'd do just that. Give it a thought, huh?" Moved, seconded, and passed by a unanimous vote. Then later from the hospital, Sherm says, "Your hopes and good wishes are a bit premature. You forget that this is a government hospital where time is not of the essence. I've been here now for two weeks and have been put through the gamut of horribly unconvincing tests and X-rays. Most of the time it has been just hanging around waiting to be able to make the exit speech for my own modest role here." . . . **John Kilduff**, also realizing that there is no turning back for any of us, gives Box 33, Amesbury, Mass., as an address and realizes that, "June, 1968, is getting more important every day. Consequently I must not put off two reports. The first concerns **Waldemar McGuire**, who came to M.I.T. from the Revere High School. He was quiet and sociable, taking part in the Chemical Society and the Cosmopolitan Club. He was so retiring not many of us realized how deep was his interest in and affection for his alma mater. Through a letter from his daughter, the class got news a few months ago that he had been dead for three years. The same letter revealed that one of his urgent wishes was to make a gift to the Alumni Fund. She has set the money aside and wants it added to our 50-year gift. This seems to me like the opening fulfillment of the prophecy I made when interpreting my dream of going to the Alumni Council meeting on a motorized lawn mower. [See March, 1966 issue.] When, three years after he can never go

back to do anything differently, Waldo reaches out his hand to join our group effort, it should be an inspiration to all of us. My second report concerns **Edwin Rossman**, retired and now living in Paris, Maine. He too is a quiet, modest classmate. Without fanfare or shouting from the housetop he has made arrangements with his attorney for a substantial contribution to our 50-year class gift. If you have a Bible, look up the 10th chapter of Luke and the 37th verse. If you don't have a Bible, do what it says anyway."

Courtesy of **Herbert Lerner**, 10 Crestmont Road, Montclair, N.J., and of **Sax Fletcher**, 12 Old Mamaroneck Road, White Plains, 10605, two copies of the New York Times article of April 21 concerning **William C. Foster** lie atop this desk. In addition to a good picture, there are 19 inches of type setting forth in convincing phrases of considerable power, the rare metal of our Bill. As the German proverb says, "Die kleiner Dinger ist die grosser Dinger," in the sense that the one reveals the other. Bill is someone touched by destiny and no man for turning back. It seems that before he became director of the Arms Control and Disarmament Agency he was nearing the finish of a sailing race when his crew, i.e. wife Beulah, fell overboard. With one hand he grabbed her by the heel, and with the other steered to finish second. In the same determined way he carries on, dragging our European allies by their heels while steering a clear and solid course toward agreements with Russia. What a nice climax a treaty preserving peace between the two most powerful nations would be to the career of a Republican business man, lured into public service by the Democrats. He should have had at least joint credit with Harriman for the 1963 nuclear test ban treaty. As this column has asserted before, Bill will never get half the credit he deserves. What a splendid, imperturbable, compassionate gentleman he is, erect and stately as a tall pine in sunshine or in a drizzle of discouragement. . . . As a result of a pleasant correspondence begun last fall, **Arthur Pope**, Waukesha, Wis., writes after reading *Living a Happy Life*, "I have tried to imagine what faith you follow. I agree so completely with all you say, but it doesn't seem to fit any church. I am an Episcopalian, and my wife is a Methodist which seems to be about as easy as any to take. My grandfather Marquis on my mother's side was Presbyterian. In fact he was a minister in Chicago. I recently read *The Passover Plot* by Dr. Hugh J. Schonfield which I have to admit appeals to me. I would imagine it would appeal to you also. I think Christian teaching is due for an overhaul. Do you attempt to name your position? [Well, Arthur, I have been called the village pagan to my face by a few stuffy Jaffrey neighbors, but basically I rest on two things: we are all God's children, and you can't break God's laws. Moses's laws? Yes. God's laws? No!] I want to tell you that we had to buy a copy of your book, *Love and Marriage*. The library lost its copy. Someone took it. [The Cornell librarian told me at least fifteen years ago that students had stolen more than twenty copies.] We have an

11-year-old son who will be brought up along your lines. He is just at the age where he can get his facts straight. We are of course thankful for your thoughts." . . . One other dividend from the ink which sometimes drips down your scribe's pen came last week as a pleasant surprise, to be added in my log cabin office to whatever other documents I have been tendered in recognition of a busy life. It says, "Presented to F. Alexander Magoun this certificate of appreciation for scholarly and authoritative contributions to the encyclopedia and the furtherance of knowledge among young people throughout the world." Anyway, the printed word is one way of preserving ideas. **Albert Mumford**, who lived at 4604 Knox Road, College Park, Md. 20740, can no longer look back, say nothing of turn back. The only information I have to date is that he died on February 5.—**F. Alexander Magoun**, Secretary, Jaffrey, N.H. 03452

'19

Edwin Pickop retired to Hawaii in 1954 and says it is a great place for retirement. His address is 4815 Matsonia Drive, Honolulu. He hears occasionally from Capt. **Fred Hewes** in Los Altos. . . . **James Moore** writes that he is approaching his 72nd birthday but still active as a textile broker. However, he manages to work in quite a few trips, five cruises in the last two years on the Swedish American Line, the best—a long North Cape cruise of 47 days, including Scandinavia, Russia, Holland, Belgium and Iceland; last year a cruise through the Panama Canal, down the west coast of South America, through the Straits of Magellan and up the east coast; and this year spent the winter, as he has for 28 years, at the Hillsboro Club at Pompano Beach, Fla., just a stone's throw from Delray Beach. . . . A most welcome note from **Maurice Goodridge**. He is a consulting engineer, after retiring in May, 1962, from Massachusetts Electric Company. He does work for the Community Fund. His three children are married, and he has three grandchildren. One family is in Colorado, one in Lexington, Mass. His son-in-law is a professor of metallurgy at M.I.T., and the third family lives in Braintree, Mass. This son-in-law teaches at Bay State Community College in Watertown, Mass. He and his wife spend some time in the summer at their camp at West Acton, Maine. . . . We regret to report the death of **Richard Stehle** of Philadelphia on February 20, 1967.—**Eugene R. Smoley**, Secretary, 30 School Lane, Scarsdale, N.Y.

'20

Our gentle and kindly friend and classmate, **Witold Kosicki**, has gone. He will be mourned by those of us who had the good fortune to become acquainted with him at recent reunions as well as by his neighbors in Ogunquit, Maine, where he had established himself as a leading citizen. Obtaining a hard won technical edu-

cation late, after escape from Poland during World War I, he made his way in metalworking in Detroit, eventually retired to New England and reestablished contact with his class. He lived to see his several sons make their successful way in the world. No man was prouder of his family or of his relationship with M.I.T. Our class is richer and we are the better for our brief association with this sterling individual. . . . Thinking of our many valued friends in the exceptionally fine Class of 1917, seniors when we were freshmen and now celebrating their 50th Reunion, we cannot help but look forward to our own 50th which will be upon us almost before we know it. Let all of us resolve to make it the most successful and memorable of all of our class gatherings—a high mark to shoot at, indeed, for we have accumulated so many fond memories of happy occasions, Turk's Head Inn, the Mayflower, Norwich Inn, Ocean House, Sheldon House again and again, Chatham Bars Inn, Red Lion Inn. The 50th will have to go some to match these. Nevertheless, it does seem to many of us that reunions keep getting better and better as time goes on, so the 50th could well prove to be the finest of all. Let all of us who are asked to help make it so, do our part to bring to the full the rich golden anniversary lustre of an illustrious class. Have a good time this summer. May it bring you added health and happiness. Write me, please.—**Harold Bugbee**, Secretary, 21 Everell Road, Winchester, Mass. 01890

'21

With the interim reunion of the Class of '21 at the Fiesta of the M.I.T. Club of Mexico City last March and Alumni Day on campus in Cambridge last month, the high level continues for the observance of the fiftieth anniversary of the formation of the Class in 1917. But this isn't all, for chronicling of the details of our June meeting and the September Alumni Seminar in Cambridge must await the appearance of the next issue of the Review in November. We hope you'll also want to read the developing special programs to mark our coming most important fiftieth reunion. Won't you please join us here around the friendly fireside of '21 in the fall? To be sure of a reserved seat, write NOW to **Edmund G. Farrand**, Kinchafoonee Lodge, Leesburg, Ga. 31763, or to **Edouard N. Dubé**, 216 Woburn St., Reading, Mass. 01867, and say you want to renew your subscription to the Review. . . . Echoes of our '21 reunion in Mexico include several illustrated newspaper articles from Spanish and English language newspapers in Mexico City, supplied by Class President **Ray St. Laurent**, which cover the Fiesta. **John M. Johnson** lives in San Miguel de Alende, Guanajuato, where his address is Apartado 79, but he was unable to attend the reunion. Sarah and **Harry Goodman** couldn't leave Boston at the last minute, due to his illness. We haven't yet had an answer to our letter of inquiry to their home at 81 Stanton Rd., Brookline, Mass. 02146, but we hope

Harry is now back to normal. Col. **Bill Ready**, 1904 Flora Rd., Clearwater, Fla. 33515, also had to cancel all his and Marty's reservations for the reunion and subsequent travel in Mexico when the medicos discovered he was in need of more than just rest and a change of scene. Agnes and **Harry Ramsay** of 268-D Avenida Sevilla, Laguna Hills, Cal. 92653, wrote Ray that they had enjoyed seeing almost every section of Mexico and that they are now planning an extensive tour to the Orient, Australia and New Zealand. **Henri Junod** wrote he had already made plans for a stay at Lyford Cay in the Bahamas at the same time. Writing from his winter home at Royal Admiral Apt. 805, 3800 Galt Ocean Dr., Ft. Lauderdale, Fla. 33308, **Arthur R. Harvey** said they would just have to "sit this one out." Josephine and **Bill Loesch** of 107 Kensington Oval, Rocky River, Ohio 44116, were off on a seven-week trip to Rio and Buenos Aires. **Joe Morrell**, 90 Bryant Ave., Dorset 5B, White Plains, N.Y. 10605, reported he was temporarily under the weather. **Jim Parsons**, University Club, 1 West 54th St., New York, N.Y. 10019, was in Europe last fall and flew back to spend Thanksgiving with Buzz Burroughs '20, a date he has not missed in forty years, except during World War II. He expected to be on his eighth trip around the world at the time of our Mexican jaunt. Jane and **Dayton Brown** were on a six-week Mediterranean cruise. He heads Dayton T. Brown, Inc., Church St., Bohemia, N.Y. 11716. Mary Louise and **Rich Clark**, P.O. Box 3807, Baytown, Texas 77520, prevented from attending on doctor's orders, set up their own miniature reunion. Anne and **Wally Adams** drove from their home at 2606 Fleming Rd., Middletown, Ohio 45042, to Baytown and spent a few days with the Clarks before flying to Mexico City. The Astrodome and N.A.S.A. in Houston were high spots of their visit.

We have had several enthusiastic communications from Marge and **Jack Kendall** about the get-together in Mexico. A note from them in Taxco praised the picturesque town and the silver factories. A later one, via the first day of Expo '67 and its special stamp says, in part: "We are still talking about the grand trip to Mexico. Now we wonder we'll go next. If all goes well, possibly it will be to Europe." Jack is semi-retired but still carries on as vice-president of Bekins Van Lines Co., 1335 S. Figueroa St., Los Angeles, Cal. 90015. Speaking of Expo '67, Muriel and **Eric Smith** were back from Mexico and at their home at 78 Dufferin Rd., Montreal 29, Que., in ample time for the opening of the fair. Eric retired in 1962 as vice-president of Fraser Brace Engineering Co. Ltd. of Montreal. He is still chairman of the board of the company and is engaged in private consulting practice. His memberships include the Engineering Institute of Canada, the Corporation of Engineers of Quebec and the Mt. Stephen Club. With the help of **Vivi Valdés** while we were in Mexico, we checked on **Francisco L. Lazo**, Course I, removed from the Class roster by the Alumni Office as stated in the '21 news in the May Review. We can now report

that his address is Gutenberg 177, Mexico D.F., and we regret to add that he is seriously ill. Thanks to Betty and **Dug Jackson**, who came to Mexico City directly from a world cruise, we received two photos of Catharine and **Harry Field**. Dug had taken them in Hawaii just two weeks before, on February 24, which Catharine had noted was "fifty-one years, to the day, since we first met." Under date of February 25, we have a grand letter from Harry, saying in part: "Thank you for your letter to bring me up to date. Last night, **Dugald C. Jackson, Jr.**, and his charming wife had dinner with us and a tour of our new retirement home, Arcadia, Apt. 1137, 1434 Punahou St., Honolulu, Hawaii. 96822. Dug took a lot of pictures with his fast developer camera and marked copies for you. Later, we drove them to their ship. They leave today, headed for Mexico, where they hope to see you and the rest of the '21 gang. Please give my 73's to all of them and our very best to Maxine." Earlier, we had received a post card from the Jacksons, sent from Nouméa, New Caledonia, showing the beach of Anse-Vata decorated with bikini-clad natives. Dug reported: "We have visited Bora Bora, Paapeete in Tahiti, the North Island of New Zealand for four days and Sydney, Australia, for three days. Now we have turned north and have started the second half of the cruise. Today we are at New Caledonia. Then we go to Suva, Fiji Islands, Naofooon (Tin Can Island), Pago Pago and Hawaii, where we hope to have a visit with the Harry Fields to make up for missing them the last time around. Betty and I celebrated our 49th wedding anniversary at dinner aboard ship while it was docked at Los Angeles, with Rosalie and Ted Rose and a classmate of Betty's. See you two in Mexico City." The Jacksons are now off on another world cruise, having left New York last April. They are not scheduled to return until next March. . . . Our Class Photohistorian, **Bob Miller**, sent us several color slides, taken in Mexico, and wrote, in part: "Helen and I expect to drive to the Cape from Washington and will also be at Alumni Day, where we hope to see you and Maxine. This will give us a chance to find out what took place after you left Mexico City; as I remember, you had arranged quite a side tour. We went to Cuernavaca and Acapulco and had a great time relaxing."

Henry R. Kurth writes that he has moved from Wellesley Hills and now lives at Apt. C85, 330 Beacon St., Boston, Mass. 02116. Our Class Representative on the Alumni Council, Chick retired as vice-president of Boston Edison and is continuing his engineering career as a consultant for Jackson and Moreland. . . . Two of the Florida commuting families have closed their winter quarters and again migrated northwards. Bertha and **Bob Cook** are back at 326 East Lake Rd., Canandaigua, N.Y. 11424. Also Anne and **George Schnitzler** can once more be found at 32 Gerry Rd., Chestnut Hill, Mass. 02167. **C. Doane Greene** has sent a new mail address of Route No. 1, Box 179, Rock Hall, Md. 21661. Have you moved from Decoy Farm, Judge, or is this just a

revised form of address? Engineer turned farmer, Judge retired from the development of automatic alarms and nuclear sources at Edgewood Arsenal in 1964. He has a married son and daughter, the latter living in Brielle, N.J. . . . **Angelo O. Fistorazzi** has returned to the headquarters of the Streamline Pipe and Fittings Co., 407 Government St., Mobile, Ala. 36602, after many years managing the New Orleans branch. **Palmer W. Griffith**, chemist formerly with American Cyanamid in New York City, now makes his home at 43441 Acacia Ave., Hemet, Calif. 92343. **John J. Condon**, Principal of the Porter Junior High School, lives at 221 Lewiston Dr., Syracuse, N.Y. 13210. . . . The Alumni Office advises that the following members of the Class have not been heard from for many years and mail addressed to them at the towns given below has been returned. They will be removed from the files unless you, dear reader, can supply us with a current address: **Laurence H. Banks**, Course X, Boston; **William B. Barrow, Jr.**, XV, Great Neck, N.Y.; **Rev. William F. Hastings**, VI, Ravenna, Ohio; **John J. Stanton**, IV, Coconut Grove, Fla. Please let us know promptly if you have any information on the whereabouts of these men.

A long letter from **Ralph M. Shaw, Jr.**, written on the stationery of the Sandy Lane Hotel, Barbados, on your Scribe's birthday and a lovely present of a complete set of stamps in a most attractive and practical folder, mark the winter travel break for Madeline and Rufe. They report good weather and that they are well and happy, but make no mention of seeing Dan Harvey there this year. Later, Rufe sent a card from Naples, Fla., saying: "We got off the plane from the Virgin Islands in Miami yesterday and holed up here. Had cocktails and dinner with Edna and **Phil Coffin**. Tried to ring in **Mich Bowden** but he would not come. We are enroute to Sanibel." Thanks, Rufe, for your courtesy and usual good reporting. . . . Your Secretary is pleased to announce that his first book is off the press and, hopefully, awaiting long lines of purchasers to clamor for it at every bookseller in the country. Co-authored with Harry E. Thomas '25, former instructor at Technology and our associate at both the Victor Talking Machine Company and the International Telephone and Telegraph Corporation, it is entitled *Handbook of Electronic Instruments and Measurement Techniques*. It has just been published by Prentice-Hall, Inc., Englewood Cliffs, N.J., in 400 pages of text and illustrations. It is simply but comprehensively organized to condense time-saving information for engineers, designers, technicians, draftsmen or anyone who must pin-point data on operating circuits and equipment measurement. We realize we have a long way to go to get within hailing distance of **Dave Woodbury's** achievement of some two-dozen books, but everything has to have a start. . . . The Railway Progress Institute presented to **John W. Barriger**, President of the Missouri-Kansas-Texas Railroad Co., the second place award in the annual freight competition "for his part in developing an outstanding program for promoting freight traffic and

for the railroad's remarkable comeback from financial trouble." Earlier this year, the Katy won a long-term contract to deliver twelve million tons of coal to a customer and, as a further indication of the interest its rebirth has generated, on the day we took the plane to Mexico, Katy stock advanced and was second most active on the big board. John's comprehensive annual report says the road has come a long way on its rehabilitation program, chiefly in maintenance of way and maintenance of equipment, and earning power is still being sacrificed to rebuild the railroad. That this is paying off is reflected in an increase of more than twelve percent in freight revenues—the biggest percentage gain of any large railroad. The Katy is rebuilding about five hundred miles of track a year to modern standards and replacing in this same time a half million ties, using five thousand carloads of new ballast. New locomotives and other rolling stock are being rapidly acquired from huge standing orders. Moving ten principal commodities—wheat, lumber, sorghum grains, automobiles, coal, fertilizers, cement, plywood, paper and beer—constitutes, in that order of magnitude, more than a quarter of the road's revenue. . . . In April, Maxine and your Secretary were royally entertained as guests of Maida and Ed Dubé during a delightful visit of several days to their Reading, Mass., home. We had an interesting tour of New England coast areas. We were also their guests at a meeting of the M.I.T. Club of Boston, where we had the pleasure of presenting to our distinguished new classmate, President **Howard W. Johnson**, the framed certificate of his full membership in the Class of '21. Thus is preserved the happy precedent, started by our beloved Jim Killian and continued by revered Jay Stratton, that the President of Technology shall have M.I.T. numerals. We are glad to report that the members of the Dubé family are enjoying much improved health and the difficulties of 1966 and early 1967 are well behind them. Mexico was, of course, a major topic and it was interesting to compare notes and pictures of the '21 reunion there in 1960 with this year's events. On our return trip, we were also regally entertained as guests for several most enjoyable days at the home of Helen and Ray St. Laurent in Manchester, Conn. Again we compared notes on Mexico. Helen and Ed Farrand phoned from their home in Leesburg, Ga., and we had a lively six-way conversation. Marion and **George Chutter** spent an afternoon at the St. Laurent's, which afforded time for an *ad hoc* meeting on our fiftieth reunion, for which George is committee chairman. We also had dinner one evening with the Saints and Rigi Silverstein at the plush University Club in Hartford. **Saul Silverstein** was in Tokyo on his sixth visit to Japan and his twenty-third foreign trip since 1952. His keen diary reports are coming in as these notes are in preparation and we'll await his return to report fully. Meanwhile, the Rogers annual and quarterly reports reflect his enterprise in their continuing good news. . . . As the recipient of the annual award of the M.I.T. Club of Northern New Jersey last year, we are looking

forward to the most pleasant duty of presenting this year's award to A. Raymond Brooks, '17, at the coming annual dinner meeting. Ray's friendship dates back to our days, almost fifty years ago, on the wartime issues of *The Tech* and we salute the Class of 1917, now celebrating its fiftieth anniversary. . . . To her husband, Bruce O. Buckland, and to the Class of 1920, we extend condolence from her many friends in the Class of '21 on the tragic death of Mrs. Florence Fogler Buckland, '20.

It is our sad duty to enter in these records the passing of three members of the Class and to express to their families our sincerest sympathy. . . . **Clinton Arthur Newton**, P.O. Box 168, RD No. 1, Glenmoore, Pa. 19343, died on January 18, 1967. He was born in Hartford, Conn., on February 12, 1899, and prepared for Technology at Hartford High School. As an undergraduate, he was a member of the Class relay team in our sophomore year, a member of the varsity track team and wearer of the "T" and a member of Delta Tau Delta. During World War I, he was a private in the S.A.T.C. at M.I.T. Newt was graduated with us in Course II and became associated with Cheney Brothers, South Manchester, Conn., in time and motion studies. He was later assistant purchasing agent of Rohm and Haas Co., Inc., Philadelphia, and then divisional purchasing agent of the American Viscose Co., Philadelphia, for all mechanical and construction equipment, a position he held at the time of his retirement in 1964. His memberships included the American Society of Mechanical Engineers and the National Association of Purchasing Agents. He was the president of his local civic association and past director of its conservation group. He is survived by his wife, the former Elizabeth W. Cooke of Meriden, Conn.; a married son, Guy, a graduate of Penn State; and two grandchildren. We wish to acknowledge a gracious letter from Betty Newton to the Class in appreciation of its expression of sympathy. She tells of their happy memories of our 45th Reunion last June and asks to be retained on the Class mailing list. . . . **James Rowland Hotchkin** of 1 Slope Dr., Short Hills, N.J. 07078, died on March 9, 1967. A native of Montclair, N.J., he was born on February 8, 1899, and prepared for the Institute at Montclair High School. At Technology, he was a member of Chi Phi, the Technology Athletic Club, the Mechanical Engineering Society, the Banjo Club, the Mandolin Club and its leader in our junior year. In World War I, he was a private in the S.A.T.C. at the Institute. Hotch was graduated with us in Course II and formed the Palnut Co., New York and Irvington, N.J., becoming its general manager, president and treasurer and a director. He had retired in 1964 as president of the Palnut Division of United-Carr, Inc., and had continued as a director of United-Carr. He is survived by his wife, the former Betty Beggs of Glen Ridge, N.J.; a daughter, Mrs. Betsey A. Mascott, a graduate of Middlebury College; two sons, Lt. William F., U.S.N., M.I.T. '56 and Johns Hopkins, and John R., Babson Institute of Business;

and two grandchildren. We are indebted to William S. LaLonde, Jr., '23, a neighbor of Rowland's, for his timely aid to us in preparing these notes. We also acknowledge a warm letter from Betty Hotchkin in response to an expression of sympathy from the Class. . . . **William Bradford Plummer**, P.O. Box 4875, Pensacola, Fla. 32507, died on April 23, 1967. Born in Chelsea, Mass., on March 20, 1900, he prepared at Chelsea High School. At Technology, he was a member of the Chemical Society. During World War I, he was a second lieutenant of infantry. He was graduated with us in Course X and received the master's degree in Course V in 1922. He had been a chemist with the Grasselli Chemical Co. and the Combustion Utilities Corp. until 1930, when he joined Standard Oil Co. of Indiana. He rose through the ranks, becoming manager of the development and patent department, manager of the chemical products division and, in 1948, president of Indoil Chemical Co., a subsidiary of Standard Oil and the predecessor of Amoco Chemical Co., from which he retired in 1956. Bill served as a lieutenant colonel on the staff of Secretary of War Patterson during World War II. He held numerous patents in his field. His memberships included the American Chemical Society, Chemists Club of New York and the Cosmos Club of Washington. After retirement, he had served as a consultant to several petrochemical companies. He is survived by his wife, the former Lillian R. McGeachin of Larchmont, N.Y. . . . To supplement the news in the April issue of the Review of the passing of **Foster Moore Post** of Santa Monica, Calif., we have received from Mrs. Post a kind letter of thanks to the Class for its words of condolence. Kay says, in part: "**Roy Snyder** and Foster were very close friends; Roy and Ida have visited us out here many times. When we moved here, Foster

was comptroller of Weber Showcase and Fixture Co. At his retirement in 1955, he was the head of his own furniture manufacturing business. He was an ardent member of Santa Monica Rotary, a 32nd Degree Mason and very active in Boy Scouting. Our daughter, Barbara, a Stanford graduate, is a research engineer with Boeing in Seattle. She has three children. Our son, Andy, also from Stanford, enlisted in the Air Force and has been flying big ships ever since Korea. He is a major, stationed in Japan. He and his wife flew here when Foster became ill. Foster died on our forty-first wedding anniversary. He was a wonderful man and an inspiration to us all."

We sincerely hope you will not fail to be with us here when the Review resumes monthly publication in November. In the meanwhile, your Secretaries will greatly appreciate word from you about your business or retirement activities, your travels and your family. As a reminder, we still would like to have that 45th Reunion questionnaire if you haven't already sent it in—for use in compiling the directory of the Class which is to be distributed to you, so you'll want it to be complete. Until we meet again, all of your officers and committeemen want to wish you and yours a very pleasant and enjoyable summer.—**Carole A. Clarke**, Secretary, 608 Union Lane, Brielle, N.J. 08730; **Edwin T. Steffian**, Assistant Secretary, c/o Edwin T. Steffian and Associates, Inc., 19 Temple Place, Boston, Mass. 02111

'22

Writing the July notes in May seems like an anti-climax as our 45th Reunion will only be a pleasant memory when you read these items. Your Secretary's trip as

spokesman for the Chamber of Commerce Trade Mission to the Middle East in April was especially successful. The thirty members visited with businessmen and government representatives of Beirut, Cairo, Amman and Jerusalem in Jordan. As the group moved into Israel through the Mandelbaum Gate, a special luncheon was provided by leading businessmen in Jerusalem where Mayor Teddy Kollek explained his problems. A later two hour meeting with Prime Minister Levi Eshkol was most interesting. He told of the advances made, especially in the past 20 years, and the border problems which flared up while we were in Damascus. After visiting Haifa, Tiberias and Tel Aviv the Mission proceeded to Istanbul and Vienna. It was an extremely busy and instructive three weeks. While in Jerusalem your Secretary climbed the 200 foot tower of the Y.M.C.A. to take pictures of the inscriptions on the balconies for **Marion S. Dimmock**. Marion had written last year of his experience in helping build this beautiful building in the early 30's. Incidentally, a copy of the New Britain *Herald* of May 1 tells of his reception for 48 newly naturalized citizens at the Y.W.C.A. Marion, as a member of the New Britain Council on Citizenship and prominent member of the community, expressed his regrets for being absent in a letter to the new citizens: "Dear fellow Americans," he wrote, "I am truly heartsick that I cannot be present and take you by the hand to welcome you to citizenship in our great country. Unfortunately, I am confined to a hospital. You will henceforth be known by the proudest name in all the world, the name of American. As an American you become heir of all those who lived before us and by the struggle and sacrifice bequeathed to us, the deathless treasures of freedom, equality and brotherhood. Welcome to our happy nation." . . . We are being honored here during May by a program entitled "Harvard University Comes to Buffalo." A prominent participant is **Daniel P. Moynihan**, Professor of Education and Urban Politics and Director of the Joint Center for Urban Studies of M.I.T. and Harvard. Professor Moynihan will be moderator for a panel entitled "The Urban Scene; Old Problems and New Attitudes." President Nathan M. Pusey (an Iowa boy) will speak. . . . **George C. Maling, Jr.**, is now with IBM Acoustic Laboratory, Poughkeepsie, N.Y. *The Journal of Audio Engineering Society* tells of his speech on the subject "Electro-thermal responses of lead-zirconate-titanate" at the Convention program. The notices include the statement that "some shapes of PZT crystals have been found to respond electrically to bursts of warm air such as those produced near the lips by spoken words. The transient response has been determined by measurement of the signals produced by an intermittent air stream. Waveform characteristics of spoken words have also been determined." A good report has arrived from **John L. Liecny** of Phoenix, Ariz., who regrets his inability to attend the 45th due to a European cruise and the Windsor Championship Show in London on July 1st. Jack has enclosed their mime-

Deceased

FRED B. CROSBY, '03, May 7
ALBERT A. CASANI, '01, September 13
ROBERT S. BALDWIN, '02, February 22, 1964
FRED B. CROSBY, '03, May 7
FRANK TOOHEY, '03, 1959
STEPHEN L. BRADLEY, '04, May 7, 1951*
J. EARL CUNNINGHAM, '04, March 14*
JOHN R. SANBORN, '04, April 2*
CHESTER ALLEN, '05, March
JOHN G. DOLEN, '06 January 6
SISTER MILDRED ELEANOR, '06, March 13
ISA W. KAHN, '06, April 20
CHARLES L. KASSON, '06, April 15*
JOSEPH V. SANTRY, '06, May 9*
THOMAS W. ROBY, '07, 1964*
CLARENCE D. MAYNARD, '09, March
HARRIS E. DEXTER, '12, April 29
JOHN P. MINTON, '12, February 20*
FRANK T. SMITH, '13, April 11
JOSEPH WARREN HORTON, '14, May 10*
REEVES NEWSOM, '14, April 30
HOWARD L. STONE, '14
ALAN S. DANA, '15, April 28*
W. FINDLAY DOWNS, '15, April 25*
M. THOMAS GREEN, '17*
JOYCE R. KELLY, '17, April 30*
MAXWELL KIMBALL, '17, September 4*
ADELBERT R. MORTON, '17, March 24*
HAROLD W. MCINTOSH, '19, January 31

MERRITT P. SMITH, '19, May 6
FREDERICK A. BROOKS, '20, March 10
HENRY W. ERICKSON, '20, November, 1963
J. ROWLAND HOTCHKIN, '21, March 9*
DONALD B. LOVIS, '21, May 17
WILLIAM B. PLUMMER, '21, April 23*
JULIAN E. BRASH, '22, December 21
HAROLD L. HUMES, '22, January 26
KEBLE B. PERINE, '22, April 16
WILLIAM P. PASHLEY, '23, April 14*
WILLIAM STEVENSON, '23, May 7
HAROLD HOLDEN, '24*
YERVANT KRIKORIAN, '24, April 27
RAYMOND B. BLOCK, '27, November 14
GEOFFREY D. BAKER, '28, December*
J. STUART WHITE, '28, April 29
ALVIN LODGE, '29, March 4
CLAUDE F. HORTON, '30, April 13*
HAROLD W. ANDERSON, '31, November 13, 1963
JOSEPH W. WETMORE, '31, April 11
ALMER H. ORR, JR., '32, April 18*
RAYMOND R. ROBINS, '32, March 27
DOM MARTINO, '33, March 13
WILLIAM W. PRICHARD, '36, April 11*
WILLIAM L. MCNAMEE, '37, 1964
JAMES P. O'BRIEN, '37, March 30
R. SPENCER BAILEY, '40, January 30
BARRY J. ROSEN, '62, July 18, 1965

*Further information in Class Notes.

ographed recital of constant travel during 1964, 1965, and 1966 including judging dog shows through the West, Central America, Hawaii, New Zealand, Australia and all over Europe. Jack will also miss his 50th at Milton Academy but promises to lift a stein of Austrian beer to us all. . . . We are certainly sorry to hear of the death of Mrs. Abbott Johnson in April and extend the profound sympathy of our Class to Abbott. Our sympathy also goes to the family of **Minot R. Edwards** of Houston, Texas, formerly of Arlington and North Weymouth. Minot was a charter member of Calvary Methodist Church of Arlington. He is survived by his wife Alice, son Thomas of Houston and daughters Alice Whittemore of Manchester, Mass., and Ruth McNamara of West Suffield, Conn. We extend our sympathy to the family of **James A. Bowers** of Waldoboro, Maine.

Among the changes of address are: Norman L. Apollonio, Camino, Calif.; Rev. **Burton G. Robbins**, Keene, N.H.; **Robert D. Stuart**, St. Croix, V.I.; **John C. Molinar**, Randolph, N.H.; and **Aubrey K. Nicholson**, Stuart, Fla. . . . A pleasant and healthful summer to you all—and in golf, may you play your age! In between time, forget it! Wait for the Big News of the Reunion in the next issue.—**Whitworth Ferguson**, Secretary, 333 Elliott Street, Buffalo, New York 14203; **Oscar Horovitz**, Assistant Secretary, 33 Island Street, Boston, Mass. 02119

'23

A letter from **William S. LaLonde, Jr.**, 77 Jefferson Avenue, Short Hills, N.J., informed your Secretary that, "On May 17, our classmate, **Arne Lier**, I, will receive a certificate from the Metro. Section of A.S.C.E. designating him the 'Metropolitan Civil Engineer of the Year.' Arne is chief structural engineer for the Port of New York Authority, and he has contributed to many projects since the 20's. He did outstanding service to the Port Authority in devising the scheme used to erect the second (lower) deck to the George Washington Bridge, in adding three upper stories to the bus terminal in New York City, and in extending the approach runways over water at Kennedy International Airport, to mention three different and sizeable projects. There has not been a structure built by the Port Authority in 40 years that Arne has not contributed to or been involved in its structural soundness. I will be attending the A.S.C.E. meeting in Seattle, Wash., May 6 to May 12 and hope to find one or more classmates of ours there. I hope you are well and enjoying retirement to the full." . . . Word has been received of the death of the following two classmates, but no details are available at this time: **Jasper Willsea**, Willsea Works, 371 St. Paul Street, Rochester, N.Y., on March 9; **William P. Pashley**, 10 Southgate Road, Wellesley, Mass., on April 14. . . . Word has been received from the Alumni Office of the following changes of address: **Samuel L. Williams**, School Street, Enfield, N.H. 03748; **Gabriel**

Nathan, 116-55 Queens Blvd., Forest Hills, N.Y. 11375. . . . The Alumni Association has notified your Secretary that each of the following names will be removed from their files unless it is requested that a name be retained. These persons did not receive M.I.T. degrees, nor have they communicated with the Alumni Office since they left the Institute. Their addresses are unknown. Should anyone on this list want to be retained in the M.I.T. files, please notify either Fred G. Lehmann, Alumni Secretary, or the Class Secretary. They are **Stanley W. Stedfast**, **Henry Uribe**, **Harcourt M. Wade**, **Sherman White, Jr.**, **Richard H. Longmaid**, **Claude W. Leathers**, **Engelbert B. MacDonald**, **Justin R. McCarthy**, **Philip Richardson**, **Henry B. Saylor**, **William S. Bateman, Jr.**, **Raphael S. Chavin**, **Anthony B. Cassidy**, **Miss Helene H. Anciaux**, **Weaver W. Adams**, **Irving M. Epstein**, **Mrs. Josephine F. Frans**, **Frank C. Isely**.

The June issue of Technology Review, and a letter to all known classmates dated May 15, have announced that plans are progressing for our 45th Class Reunion, June 6 to June 9, 1968, at the Oyster Harbors Club, Osterville, Cape Cod, Mass. All classmates are urged to make a gift to the Alumni Fund (large or small). This will insure their receiving Technology Review regularly each month November through July. In this way you will be kept up-to-date on Institute activities and the class reunion plans as reported in the Class News. Also, class dues have not been requested for five years. Your cooperation is solicited in this direction. Your \$10.00 dues should be forwarded, as soon as convenient, made out to **Forrest F. Lange**, Treasurer. This will enable your committee to function and plan one of the best reunions we have ever had. At the same time be sure to include your correct home address and zip code for future mailings, company affiliation, address and zip code, title, number of children and grandchildren, and special interests and news.—**Forrest F. Lange**, Secretary, 1196 Woodbury Ave., Portsmouth, N.H. 03891; **Bertrand A. McKittrick**, Assistant Secretary, 78 Fletcher St., Lowell, Mass. 01852

'24

If you have ordered one of the forthcoming Alumni Registers, don't be surprised if the Class of 1924 appears a bit smaller than you might have expected. It will be. Periodically the Alumni Association does a spot of weeding to keep the files realistic. If a man did not get a degree from M.I.T., and if there has been no communication from him since leaving the Institute, (that means 43-plus years for us), it hardly seems worthwhile to keep his name on the files. As a consequence, 16 such men were removed from the rolls in May. . . . Of course not all "lost" men remain lost forever. **Robert C. T. Smith** was a classmate of **Hood Worthington's** at Tome School. He started out with us but left early in 1921. He was removed from the rolls years ago—no address. **Hood** thought he was dead, but this spring

he turned up, very much alive. Unfortunately **Hood** was out of town at the time, but he left a note. Included was a list of some of the places where he had worked through the years: Newfoundland, Spain, Cambodia, Dewline, Turkey, Greece, Germany! Is it any wonder the Association found it impossible to keep up with him? One man in this category was saved by the bell. **Stanley A. Higgins** replied to an Alumni Register mailing with an address in Arlington, Mass., and the terse information, "I am now working for Whitman and Howard, 89 Broad St., Boston. I was formerly with Metcalf and Eddy." . . . Shades of the Roaring Twenties—or, Like Father, Like Son. Among those who rarely missed a dance of any sort during our undergraduate days, and who capitalized on his lightfootedness by gracing the Tech Show chorus line, was **Paul Cardinal**. Now his son **Richard** has achieved a certain amount of terpsichorean success in Upper Montclair. With his wife as a partner they won, of all things, a Charleston contest. Mrs. Cardinal should have had some sort of special medal. Just three weeks before she had produced **David Richard**, grandchild #19 for the exploding Cardinal flock. . . . **Dr. Clarke Williams**, deputy director of the Brookhaven National Laboratory, has a new chore. In March the AEC appointed him to the panel from which the Commission selects Atomic Safety and Licensing Boards. "The principal function of these boards is to conduct public hearings and make initial decisions on applications to construct nuclear power plants." Most of us are more concerned at this stage with other kinds of plants. But then, not all of us have the same retirement hobbies. . . . A new edition of "The Properties of Gases and Liquids; Their Estimation and Correlation," one of whose co-authors is Prof. **Thomas K. Sherwood**, appeared recently. Tom just may be producing another kind of book in the future. This summer he is scaling the Canadian Rockies again, but this time he is accompanied by one of those fantastic Questar telescope-camera outfits. Maybe "Sherwood's Rockies" will turn up as a consequence. . . . The Lehrers are back home at last after an eventful trip. They waded along Australia's Great Barrier Reef among squid, sea clams, and tiger sharks (baby-type); toured New Guinea where they saw (but did not participate in), some "first class fights where they knock each other out cold, literally," in Port Moresby beer parlors on a Saturday night; moved on to Minj where "men and women wear hardly any clothes. They are known to have what we might consider loose morals." Then on to Tahiti, (no sociological comments there), and thence home. . . . Hardly seems worth mentioning in the same column, but when snow and cold weather persisted into late April, the Kanes got tired of waiting for spring to arrive and decided to meet it halfway. Our cabin in the mountains near Hot Springs, Virginia, was surrounded by pink and white dogwood in the height of bloom, azaleas, trillium, and singing birds. Back home again by mid-May in plenty of time to see spring arrive all over again. Although more probably at this late date

it will be a direct step from winter into summer. . . . **Harold Holden** graduated in Mechanical Engineering. There has been no information about him until this spring, when his son sent word that he had died. No date was given. . . . And so another year of writing these columns comes to an end, and with it the usual seasonal plea, happily acted upon by many of you in the past. Do take time during the summer to drop your Secretary a note about your doings. If you go traveling, at least make it a postcard. Here's the address—**Henry B. Kane**, Secretary, Lincoln Road, Lincoln, Mass. 01773

Henry B. "Chick" Kane has been Secretary of the Class of 1924 since 1949—a faithful and outstanding contributor to these columns of Technology Review. This year he reaches the age of retirement from his M.I.T. post of Alumni Fund Director, though he has been on special "leave of absence" status this past year. It is M.I.T.'s loss that his work with the Alumni Fund must now officially end; but it is the great good fortune of the Class of 1924 that his membership in our fraternity cannot terminate and that he continues to serve us as Secretary. Chick came to M.I.T. to organize the Alumni Fund in 1940; earlier he had served as a member of the Advisory Council on Undergraduate Publications.—W. H. MacC.

'25

The last month has brought several letters from classmates which provide information which will prove interesting to all of you. **Bill Bishop** writes from Westfield, N.J., noting that he has been retired from the Bell Telephone Laboratories since June of 1963. He spent more than 36 years with the Bell Labs, 20 in the Chemical Research Department, and about 16 in the Outside Plant Development Laboratory. Bill was in Course V, and he notes that **Stan Lane**, also Course V, has been retired for a couple of years from the Standard Oil Company and he lives in Westfield, N.J., also. . . . In the past several months **Henry Sachs** has been on an extended trip which took him to many parts of the world, but I will let you hear of his trip in his own words. "My wife and I had a most interesting trip to the East. We left New York January 30, after I got back from the Annual Program Meeting of the Council on Social Work Education in Salt Lake City. We flew direct to Beirut, Lebanon, visited Byblos and Baalbek. Fortunately, we had a letter of introduction to the Dean of Men at the American University in Beirut and got a private and extensive tour of this marvelous institution. It is a real credit to us Americans. From there we flew to New Delhi. India far exceeded our fondest expectations. It is a very complex and immensely interesting country. Although we had done a lot of homework on history, religions, art, culture, etc. and had been to the Indian sections of many museums, we were in for a lot of surprises. Besides seeing the usual sights, we had dinner at the home of an Indian family,

met with the government and lay leaders of social welfare (through the Social Welfare Attaché at our Embassy) and visited a nursery school for 'untouchables' (as they were formerly called), a Community Center run by the city and the local YWCA. We also met some Americans in AID and, of course, the Peace Corps. Then by car to fabulous Jaipur the pink city, a must for anyone who visits India. We had to go all the way to Rajasthan to attend our first Rotary meeting—all Indian. Then via the fabulous deserted city of Fahtepur Sikri to Agra with its terrific Red Fort and the indescribably beautiful Taj Mahal which we kept visiting and re-visiting. We flew to Benares, the holy city of the Hindus, and found the museum at nearby Sarnath a small but real gem. Then off by air to Kalmater, Nepal—altogether different and fascinating in its own way. We were fortunate enough to be invited to the Embassadrix's home and learned a great deal about what goes on there—a sort of Switzerland of Asia. Indian Air Lines got behind schedule and we therefore spent an extra day there, but then flew on to Calcutta and then Madras, where we visited the wonders of the holy city of Kanchipuram and the architectural and sculptural marvels of Mahapalipuram. Then on to Ceylon with the Indian Davis Cup Team aboard our plane, a real tropical island reminiscent of Trinidad but with red double-decker London buses coming toward you in the middle of the jungle. The history and the sights of Sigiria are among the most fascinating ever and Polaranuwa, formerly a city of over 1,500,000, a treasure-trove for explorers and visitors. The botanical gardens in Kandy are the greatest ever. Our plane to Bombay was almost wholly filled up with Muslim pilgrims with their wives en route to Mecca—real pilgrims. Bombay was most interesting. We visited a community center and a local indigenous group who were cleaning up and rehabilitating their area. They were anxious to listen to our suggestions and so were the faculty and the students of Bombay University's School of Social Work whom I was asked to address. After seeing the Taj Mahal it is impossible to talk of a highlight of India, but the Ellora and Ajanta caves to be seen in two days in that order from central Arangabad do fit into that category. They are marvels indeed and must be seen to be believed. Words, pictures, photographs, nothing can do them justice. On the way home we broke our trip in Rome which for early March put its best foot forward. The weather was gorgeous, and eating and drinking El fresco in the gorgeous Piazza Navona or the Via Veneto and the sumptuous Italian food provided a great change of pace. We await our next adventure!"

As has been reported on previous occasions, **Ave Stanton** continues to be a most active person in municipal affairs in Natick, Mass. He has recently supplied your Secretary with a newspaper clipping which indicates that he is a member of a large town committee which has been appointed to study the possibilities of the town acquiring a strip of land to allow the Gillette Company to put up a plant. From some of the details supplied by Ave, who

incidentally is a member of this committee by virtue of his being on the Natick Board of Assessors, it appears that the group is presented with a rather complex problem. . . . The Alumni Association Office has provided some information supplied to them by **Ken Reynolds** who indicates some of the many activities he has become involved in since his retirement. He has written as follows: "Since August 1965 I have been the hydraulic consultant to Koebig & Koebig, Inc., a Los Angeles engineering firm. Between June 20 and November 30 I am Visiting Professor of Water Science and Civil Engineering and Visiting Hydraulic Engineer at the University of California in Davis, Calif. I have charge of the hydraulic research laboratory (largest in the state) where various hydraulic models are being studied. Six models are now being tested or are under construction—all in connection with bringing northern California water to the south." . . . A change of address has come through for **William T. Brown, Jr.**, indicating that he has moved from Hastings-on-Hudson, N.Y., to Bailey Island, Maine. Anyone wishing to write to Bill should include in his Maine address Post Office Box 31. It would appear that he has retired. . . . Word has come to the Alumni headquarters that **Philip Gruber** passed away on March 1, 1967, in Shawnee Mission, Kan. Also from the Alumni Association word reaches us that **Pascal J. Morell** died on February 14, 1967.—**F. L. Foster**, Secretary, Room E19-702, M.I.T., Cambridge, Mass. 02139

'26

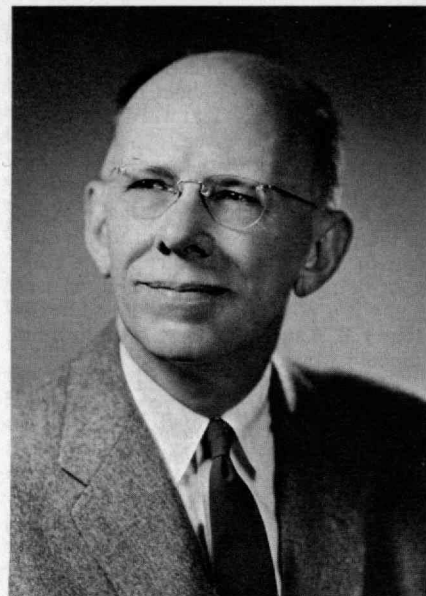
This final issue has called for a review of the class notes folder to make sure we tell you all the news before fall. However, anything that has not previously been printed here is usually news because we are learning it for the first time. Let's start with **Bill Wraith** who retired as V.P. of Anaconda sometime ago, having spent his entire career since graduation with this company. Bill's activities were in design and construction of metallurgical plants in Chile, Mexico, and the United States. Bill and his wife planned to make their retirement home at Tucson, Ariz. . . . A recent letter from **Bill Latham** states: "While memory is still fresh here is a report on **Jim Killian's** visit to Buffalo. Jim flew in yesterday morning and was entertained with a rather lavish luncheon at the Buffalo Club hosted by Charlie Diebold '58, President of Western Savings Bank and Whit Ferguson, '22, President, Ferguson Electric Construction Company who unfortunately happened to be in Egypt. The luncheon was attended by some 75 of the top men in industry, business and banking in the Niagara Frontier area. Jim spoke off-the-cuff for about 20 minutes without notes and with very polished delivery. In the evening Jim was the guest of honor at a dinner sponsored by Alumni of whom over 100 of our total membership of 300 were present mostly with their wives. Also attending were representatives of most of the educational bodies in the area, many industries and a few other people to a total

audience of over 500. Because he was being video taped, Jim got formal and read most of his presentation but interpolated a number of comments along the way. It was a very erudite presentation and favorable comments were numerous and enthusiastic. As the only other member of the class present, I had the privilege of basking in considerable reflective glory. Jim looked unusually well and was most gracious throughout what must have been a very trying schedule. I happened to be present when one of our younger alumni came up to Jim and told him how proud he is to be a Tech Alumnus and to have had the advantages and benefits of the strength that Jim has built into our alma mater. Sincerely, Bill." Thanks, Bill! Over the years you have been one of our more faithful correspondents. . . . Another correspondent, **Gordon Spear**, writes from 5201 N.E. Terrace, Pompano Beach, Fla. 33064: "Dear George—This is our retirement home—have sold our house in Michigan and expect to do a lot more traveling before settling down too long in one place. The trash collector's trucks here have big signs on them, FREE SNOW REMOVAL. I like that! Gordon." Gordon, I like that sign too. I just noticed our snow shovel in the furnace room this morning and put it on today's agenda to tuck it in mothballs. This really has been a rugged winter here by the sea, but it has been beautiful. An easterly storm churned the sea into an icy cauldron that filled the air with spindrift so laden with salt that hosing down the windows after the storm had no effect—it had to be removed with detergent. A few hardy lobstermen had put out their pots to gain the benefit of an all time high wholesale price of \$1.30 per pound. They were caught badly and I know of several who lost more than 120 pots. It's part of their cost of doing business but they are never prepared for it. . . . We recently received the following from **Mal Epstein**—written in Boston of all places: "Dear Smitty, Just a note to tell you I am in Boston for a day on business and that I would like to have been able to say 'hello' to you personally. I was one of the lucky ones attending reunion last June and also the visit to Pigeon Cove. After staying away from Boston for thirty years the class reunion brought me back in a hurry. This is a belated 'thank you' to the committee and to say that our fortieth reunion was wonderful and I look forward to the forty-fifth. Sincerely, Malcolm Epstein, '26, Jefferson City, Mo." . . . Another recent visitor to Boston was **Jim duPont** who was the principal speaker at a dinner we had at the Algonquin Club. Jim has been making speeches for years but this was the first opportunity we have had to hear him. We knew he was good but had no idea he was so well organized. It was a pleasant evening because most of it was spent with Jim. He plans to retire in the fall and one of the visits on his agenda with his wife Helen is Pigeon Cove. . . . A surprise letter from **Elton Staples** from Tokyo: "Dear George and Ruth, Miriam has joined me here in Japan for a few months while I hopefully get a joint venture company approved and under way. Then we will build our 'dream home' on a lot in Chatham we bought after the 40th Reunion last June.

I have been here since last September, except for a month in Chicago and Florida over the year's end. Setting up the joint venture agreement with our Japanese partner, and now negotiating for Japanese Government approval seems to take twice the time we expect. I enclose a clipping from Thursday's *Asahi Evening News* telling of **Jack Kimberly's** visit to Japan. I have not found his hotel yet, and he leaves tomorrow. Maurice James, '27, of M.I.T. Club in Milwaukee, is in Tokyo, and his wife, Jo, too, while he unsnags some of the problems of the Bucyrus Erie, Komatsu, Mitsui joint venture. We see them often. Needless to say, we are looking forward to getting back, to try out the GWS Reunion Punch. It's good to have the formula, better to have the punch! We hope to see **Shantanu Kirloskar** in Poona, and **H.Y. Lo** in Taiwan before returning home. Cordial best wishes to you and Ruth, Elton and Miriam." The clipping with Jack Kimberly's picture looked like Jack but a full page photo of two thirds of Jack's face appeared in last Sunday's Boston *Herald*. It was sent to us by Ken Brock and it was so large that we had to put it on the floor and stand on a chair before we could catch a resemblance to our classmate. It was prepared by the American Newspaper Publishers Association. Pretty good coverage Jack—from Tokyo to Boston! . . . I'm sure we have overused our space but Carole Clark '21 sent us a clipping about a new honor, the Bard Award, for **Barney Gruzen**: "The firm, Kelly & Gruzen, received the 1967 First Honor Award for its design of Chatham Towers, a middle-income cooperative apartment development in the City Hall area of Manhattan. The award was presented at a reception in the Plaza Hotel where Secretary of the Interior, Stewart L. Udall, and Mayor John V. Lindsay were guests of honor and principal speakers." Congratulations again, Barney! This winds up class notes season, but next week we plan to go down to Cape Cod Shipbuilding to pick up our new little fiberglass sailboat—a Herreshoff design 16 foot keel boat. You can think of us out there in late July and mid August soaking up the summer sun and southwest breezes. Don't forget to send us some kind of communications—a four cent postcard will do. We will be looking forward to your message. Until we hear from you, Cheerio!—**George W. Smith**, Pigeon Cove, Massachusetts.

'27

Clarence L. A. Wynd, President of the Alumni Association in 1960-1961 and most active in M.I.T. affairs since graduation, has retired as vice-president and a member of the executive committee of Eastman Kodak Company. He will continue as an Eastman director. Clarence retires as head of the largest single component of Eastman Kodak and after nearly 40 years of service. As manager of Kodak Park, which manufactures photographic film, paper, and many other products, he has directed vast changes in technology and operations. In civic activities in Rochester, he has been president of the Cham-



Clarence L. A. Wynd, '27

ber of Commerce, a director of the hospital fund, the community chest, and the Planned Parenthood Association. A meritorious career and this is surely not the end. . . . Further, **Fred Hooven's** winning the *Scientific American's* international paper airplane competition in the duration aloft (professional) category, a full page advertisement in the *New York Times* included a picture of his flying wing in flight under stroboscopic illumination. There was also the interesting comment that Fred had "learned his aerodynamics as a student of Orville Wright's, using Mr. Wright's own wind tunnel for early testing." A new address has arrived for the Hooven family: RFD 5A, Elm St., Norwich, Vt. 05055. . . . We have never kept too good track of **Bob Hatch**. His more recent work was with Arabian American Oil Co. in Saudi Arabia. A different new address is 86 Briarcliffe Acres, Myrtle Beach, S.C. 29577. . . . We previously reported that **Hall Hately** is in real estate in San Juan; we can add that he is with Cushman & Wakefield of Puerto Rico, Inc. . . . **Charlie Hurkamp's** new address in Atlanta is 44 Carolwood Lane N.E. . . . A new (to us) address for **Harry Moser** is 162-21 Powells Blvd., Whitestone, N.Y. 11357. Our last previous address was Schenectady. . . . Other new addresses: **Walter F. Blake**, Winnetucket Road, Plymouth, Mass. 02367; **Constantine Bary**, Four Views, Ft. Washington, Pa. 19034; **Henry C. Fowler**, 20 Green Way, So. Yarmouth, Mass. 02664. . . . Where were they then? In the July notes of 1952, **Ted Bogardus** was raising Christmas trees in Pennsylvania; **Hall Hately** was with Farrington Mfg. and had just moved to Milton; **Don Spitzli** had just been put in charge of Linen Thread's new lab at Patterson, N.J.; **Bill Young** was producing a new and better strain of broccoli at Forstdale, Mass.; and that was not so long ago. . . . This winds up the class notes until the November issue. Hope many of you had a fine time at the reunion; a report of the events will be a part of the next notes.—**Joseph S. Harris**, Secretary, Massons Island, Mystic, Conn. 06355

We emphasize that these class notes are being written on May 9 for the July issue. This two months' drag makes it impossible to describe what we expect to be a tremendously successful 39th weekend reunion in Cambridge preceding Alumni Day. However, I am sure that our Class Chairman will send out a special bulletin after Alumni Day describing both festivities and plans for our 40th. . . . We are indebted to the public relations department of Eastman Kodak Company for news of Ken Mackenzie's retirement. "**Kenneth J. Mackenzie**, superintendent of the paper mills division at Kodak Park Works, has announced his plans to retire from Kodak on January 1, 1968. Mackenzie will serve in an advisory capacity until his retirement. Mackenzie began his career with the company in the Kodak Park chemical plant in 1927 and soon transferred to the paper mill where he began a chemical control system for paper and established the mill laboratory. After receiving his degree from M.I.T., he began a three-year survey to determine the varied needs of Kodak Park departments for papers used in contact with sensitized goods. He later coordinated Kodak's manufacture of these types of paper, designing manufacturing machinery and the Building 62 paper mill. He became successively a supervisor, then assistant superintendent, and in 1947 superintendent of the Kodak Park paper mills. On trips overseas, in 1955 Mackenzie surveyed the Brazilian paper industry and in 1956 studied the photographic base paper industry of Europe. Mackenzie is a native of Sydney, Nova Scotia. He attended Acadia University in Nova Scotia and the Massachusetts Institute of Technology. He was winner of the Bolton Award of the American Pulp and Paper Mill Superintendents Association in 1945 for an outstanding paper on employer-employee relations. He has been active as a member of the Technical Association of the Pulp and Paper Industry and is a former chairman of the association's hydraulic committee. He is a member of the Paper Industry Management Association, American Foreign Policy Association, N. Y. Academy of Political Science, and the American Academy of Political and Social Sciences. He has lectured at the University of Maine on paper technology. Mackenzie and his wife Josephine live at 8 Elmwood Hill Lane, Rochester, N. Y. 14610."

We are regularly in touch with **Charlie Worthen** at Little Compton, R. I., while in the process of planning a biographical sketch book for our grand 40th. Recently Charlie noted that **Geoffrey D. Baker**, Course XV, died December of last year. His last address was Wicomico, Charlotte Hall, Ind.

We are indebted to **Jim Donovan** for the remainder of the notes which follow. He enclosed an annual report brochure from Baldwin-Ehret-Hill Inc., of which **Edward R. Stevens** of our class is president. A quick glance shows that sales were up, income was up, and profits were up, which speaks very well for the management. B-E-H of Trenton, N. J., manufactures a variety of

insulation materials with net sales in 1966 of over 27 million dollars. . . . Also from Jim: "During the week of April 10 I made a series of one night stands, talking to chemical engineering groups. This took me into Oak Ridge, Tenn. I telephoned Ann and **George Palo**—they were just packing their suitcases and leaving for London. George was to see the power authority over there. Apparently they traipse back and forth quite frequently. Olap told me that **Claude Rice** had telephoned to him while he was on his way west with matrimony in mind, also that **Jenny Stack** was in the area making a speech. George recently had published a lead article in *Pow-er*. . . . We have a post card from Tavernier, down in the Florida Keys, in which **Trudy Francis** says that on their motor trip down the Keys and up the West Coast they quite naturally stopped to see **Charlie Richheimer**—and apparently were making a bit of an extended stay and enjoying that wonderful guy's company. Charlie and Don were out fishing; Trudy was doing the wifely chore of writing cards to friends." . . . A recent letter to Jim from **Dave Bradshaw**, whose letterhead states he is vice-president and general manager of the TV-Radio Department of Young & Rubicam, Inc., New York, includes the following: "I also get somewhat involved in my two daughters' activities. Carol is a freshman at Bennett College and Marilyn is a junior in high school and very much involved at present with plans for college . . . Though I work for an advertising agency, I am involved in recommending and buying network television shows for our clients—not in the creative area . . . I am still working on a couple of prospects to be contributors to our Class Gift and, yes, I do intend to be there for our 40th." . . . So ends our class notes stint for the past season. Please send in some grist so that our mill can start churning for November notes.—**Hermon S. Swartz**, Construction Publishing Co., Inc., 27 Muzzey St., Lexington, Mass. 02173

'29

We find our file on questionnaires has dwindled down to eight which we will complete in this issue and, again, want to thank all who were kind enough to respond. To review, we had mailed out 667 questionnaires in June of 1964 and had received replies from approximately 215.

Joseph Speyer has been in the life insurance business during most of his career and is General Agent, Speyer Agency, Berkshire Life Insurance Company. He is a member of the Boston Chapter Chartered Life Underwriters (past president). The Speyers reside in Newton Center, Mass., and their son Jason Lee is also an M.I.T. graduate, class of 1960 . . . **Tom McCue's** address is Newton Highlands, Mass., and he is engaged in library work, Chamberlayne School & Junior College in Boston. His many activities include religious organizations, Brookline Council No. 110 K. of C., steel business and dismantling, business sales, charities, government, export-import. . . . **Charles**

Frank is a quality control inspector for Raytheon in Waltham where he resides. He had studied business administration and accounting after leaving M.I.T., has been to many places and many stations with the armed services, and is looking forward to a leisurely trip around the world after retirement. . . . **Marshall David** is assistant manager of the Boston Gas Company with whom he has been associated since graduation. His home is in Wellesley Hills where he is very active in Boy Scouting, having been awarded the Silver Beaver from Norumbega Council. Marshall's questionnaire lists 10 professional activities including membership in the industrial planning committee of the Greater Boston Chamber of Commerce.

From N.H. we have received questionnaires from five classmates. **Walter Gale** is retired after 20 years with the M.I.T. Faculty Administration. His hobbies include golf, fishing and traveling, and he and his wife Joan live in Melvin Village, N.H. . . . **Vinton Yeaton** is a U.S. Civil Service retiree and lives in Hampton Falls. . . . **Charles Greene** is now retired in Canaan, N.H., having worked for 32 years with Lage Oil & Transport Company, Ltd., a subsidiary of Standard Oil Company. He traveled extensively in his work, and after retirement the Greens visited Europe. Flying and hiking are his favorite hobbies. . . . **Ira Abbott** was associate director of research for NASA when it was formed in 1958 and in 1962 he retired as director of Research and Advanced Technology. The Abbotts have a home, which was built in 1794, in Sandwich and Ira spends a lot of time fixing it up and pursuing his hobbies of hunting, fishing, electronics, and history.

This brings us to the last of the questionnaires. As Class Secretary I am most grateful to all who have kept me informed of their latest activities and whereabouts



PHOTO: JOHN A. LUNN, '17

Two hostesses at the M.I.T. Club of Mexico's annual fiesta in March, 1967: Mrs. Carito Avalos (left), whose husband is a member of the Class of 1929 and proprietor of Autos Elegantes, S.A., in Mexico City; and Mrs. Conchita Z. Lobdell, an honorary member of the Class of 1917.

and hope you will continue to do so—it certainly is a great help to have a supply of material for that monthly deadline. In reviewing, I find myself guilty of never having filled out a questionnaire and perhaps some of you are wondering what your Class Secretary is doing. Since 1931 I have spent many interesting and rewarding years with Improved Machinery Inc. in Nashua, N.H., and have been president of this firm since 1951. Our company manufactures pulp and paper machinery and plastic molding machinery and is now a subsidiary of Ingersoll-Rand Company. My wife Olive and I live in Nashua, have two sons and two granddaughters. We enjoy traveling and spend our summer holidays at our camp on Squam Lake.

From a newsclipping of March 1, we saw the name of **Hunter Rouse** listed among many prominent engineers and scientists as a member of the joint National Academy of Sciences-National Academy of Engineering advisory committee to the U.S. Department of Commerce's Environmental Science Services Administration (ESSA) which has been established to review ESSA science and engineering programs. . . . From Hawaii we read of the interesting work of **Clarence C. T. Loo**, President of Volcanite, Ltd., a company producing a lightweight concrete and concrete product made from a natural mineral resource on the islands. The December, 1966 issue of *Hawaii Business & Industry* carries an informative article on "The Success Story of Volcanite" which includes pictures of C. T. Loo. . . . Hope you all have a wonderful summer. Best regards.—**John P. Rich**, Secretary, P.O. Box 503, Nashua, N.H. 03060

'30

In the month of May Class Secretaries have much the same feeling that the youngsters do in June. For the Secretaries, May marks the beginning of a three-month vacation, no more notes to be prepared until next fall. Have a pleasant summer. . . . Joyce and **Fred Holt** are in the process of building a Caribbean hideaway, presumably for retirement purposes, on the island of Grenada. He doesn't say when the new home will be ready to receive visitors. As many of you know, Fred is executive vice-president of Brown-Bridge Mills in Troy, Ohio. He is a former city councilman and is currently secretary of Civic Recreation, Inc. which apparently manages a sports arena. Joyce is currently Ohio state chairman of hospital auxiliaries. The Holt's daughter, April, spent a year at Knox College and is now a sophomore at the University of Cincinnati majoring in the education of retarded children. . . . **Lawrence Gonzalez** is living in Madrid but travels extensively in Europe and ranges as far as Iran and Pakistan. He is working on the U.S. off-shore procurement program which "Midwest legislators take a dim view of." He is currently "trying to phase out the programs but having trouble with Parkinson's Law." His hobbies include "collecting cathedrals" and visiting prehistoric Greek and Roman ruins. The Gonzalez' daughter, Peggy, will

graduate from Smith this year and next year plans to do graduate work at Tufts' Fletcher School of Law and Diplomacy. . . . **Phil Holt** is in research administration at Esso R. & E. Company. He recently retired as a trustee of the Overlook Hospital in Summit, N.J. The Holt's two children, Frances and Phil, Jr., are both married and each has a daughter. Phil, Jr., took both his undergraduate work and a law degree at Yale. He is now assistant counsel of the New Haven Redevelopment Agency. . . . The third Holt from whom a communication was received this month, **George Holt**, is teaching art and architecture at Bennington College. He has one of the most unusual hobbies that I have had occasion to report. He owns and operates a Christmas Tree farm. He doesn't say whether this is a profit-making enterprise. George reports having recently seen **Hazen Sise** who is an architect in Montreal, P.Q. . . . **Tom Hickey** is now manager of a patent examining group in the U.S. Patent Office. The Hickeys have two sons, Tom, Jr., who is at V.M.I. and Robert who attends Yorktown H.S. in Arlington. . . . Those of you who took Course XV may recall the rather unusual circumstance that we had a pair of brothers from Texas who graduated with our class. According to the Technique biographies **Dwight** and **Claude Horton** were both born in the same year, Dwight in January and Claude in December, and both graduated in Course XV. A recent communication from Dwight brings the sad news that his younger brother Claude died in Houston on April 13, 1967. At the time of his death Claude was vice-president of Dillingham Pipeline Construction Company. He had done submarine pipeline consulting work all over the world and was in charge of the new underwater working laboratory off Hawaii. Dwight reports that he himself owns and operates a ranch at Fischer, Texas, and does some consulting on heavy construction. The Dwight Hortons have a married daughter and three grandchildren. . . . Changes of address: **Norman J. Smith**, 1232—111th Ave. N.E., Bellevue, Wash. 98004; **Juel H. Lensch**, 26 Muth Drive, Orinda, Calif. 94563; **Louis H. Gitzinger**, 1423 Shroyer Road, Dayton, Ohio 45419—**Gordon K. Lister**, Secretary, 530 Fifth Avenue, New York, N.Y. 10036

'31

It certainly was a pleasure to see **Dave Buchanan** looking so well at lunch recently; he seems to be enjoying life as usual. Also ran into **Emilio Collado** and his charming daughter at lunch shortly after seeing Dave. Emilio's son was married last fall—a fact which I believe was reported in our earlier notes. An article in the *Food Mart News* told of **Bill Kay's** appointment as president of Associated Products, Inc., a subsidiary of Campbell Soup Company. Congratulations also to **Dave Bernstein** upon his election as president of American Biltrite Rubber Company.

Best wishes for a pleasant summer. If you have a little time to spare during your

vacation, a short letter bringing me up to date on your activities would be appreciated.—**Edwin S. Worden**, Secretary, 35 Minute Man Hill, Westport, Conn.

'32

This issue winds up another year of the Review. News picked up at the Reunion will have to be reported next year since it has not yet happened when this is being written. . . . We learned of the death of **Maurice Cook** on November 15, 1966, from his wife Annette now living at 470 Paradise Isle Blvd., Hallandale, Fla. . . . The death of **Almer Orr, Jr.**, on April 8, 1967, has been reported by **Tom Sears** who was able to attend the funeral and visit his family in Pittsburgh.—**Elwood W. Schafer**, Secretary, Room 13-2145, M.I.T.

'33

Here we are, off again and on the last lap of the school season. I must admit that I do not look forward to what appears to be a long vacation, as, for some reason, things start coming to life along about now, with the next issue after this, as I write, seven months away. There is no possible way to make so many men conscious of the fact that they have just received (April) about the shortest, and least valuable set of notes that I have ever sent in; 35 column inches, about half enough. However, one bright spot is that the April Review was on the newsstands as early as it ever was before the major changes in the magazine took place. I do hope all Class Secretaries, as I hereby do, take a moment to tell John Mattill and his hardworking staff that they have done a bang-up job of, shall I say, modernizing, a very conservative old journal. Overall, the feeling among those to whom I have talked, is that we are getting a better Review. From one of the busiest of our many silent and busy classmates, comes a fine, personal, chatty letter, the kind that warms this old heart with its sincerity and personal charm. It is from **Bob Winters**, Le Ministre du Commerce, Canada. In part, I quote, "Thank you for your personal note of March 22nd. I read the Technology Review hungrily each month, and enjoy hearing about our classmates. . . ." To you who receive letters, and don't reply, I refer you to the above quotation from a man who is as busy, or busier, than any of you perhaps ever were. Bob promises to send me his various speeches, etc. as they come out and hopes I do not feel I have to read all the material. I have already told Bob I read every word, but do not necessarily agree with all that I read. Bob has two children, which I knew about, but had sort of forgotten. Son Henry is an engineer, a graduate of Queen's University, is married and is currently in Sault Ste. Marie, Ontario, with the Algoma Steel Company and is doing right well. I quote again, from a proud father, "Daughter, Marny, is in her last year at York University, which, you may recall, is the Institu-

tion I helped establish as its first Board Chairman." York already has an enrollment of 5000 students and is growing fast. Marny will graduate this spring, and will then go on to study law. To **Ed Goodridge**, please send Bob a copy of your last letter to the faithful, as he seems to have missed that one! Bob was interested in knowing that I attended the Mexico City Club Fiesta, and says several Alumni he has met attended and enjoyed it immensely. Bob, I speak for many of the classmates that have enjoyed you in the past, when I say from the heart, "Thank you," and we all join in sending our best to lovely Eleanor. Following my short exchange of notes from **Jack Frost Andrews**, I had to tell Jack that I could not read the first name of his fiancée, and, not having had word from him before the deadline, I had to guess at what I saw, and was way off it appears. Without exposing myself too much, I hasten to inform all and sundry that Jack's best girl's first name is Jermain, and the full name is Jermain Johnson Mueller. See the June issue for Jack's full and most complete story. I have a fine letter from **Fred Aldridge** in response to an earlier one of mine, wherein I made a request for Notes material. I sent Fred a partial list of our classmates in the far northwest area, to be used for phoning purposes. Fred mentions **Quinton P. Peniston**, who did no undergraduate work with our class, but who did take a masters at that time in chemical engineering. Some of us knew Quint, who has his own research laboratories known as Food Chemical and Research Labs. He also phoned **Roger E. Greenwood**, who is in the construction business. And now a word about Fred, who, upon his retirement, was awarded the Public Health Service Commendation Medal. "F. F. Aldridge, in recognition of his outstanding contributions over a period of 11 years in the direction and execution of technical assistance programs in Public Health, in Greece, the Middle East, Iran, India and Libya," read part of the citation which enabled his name to be made a part of "Who's Who in America." Congratulations, Fred, from all those friends and classmates who knew you when. We are proud of you. I cannot refrain from making one more quote from the far northwest: "I will do my best to serve as your northwest assistant and to keep you informed, and it will be a pleasure." Thanks, Fred. You are a true friend, and a very loyal alumnus. Incidentally, Fred congratulates us on our having selected the Chatham Bars Inn for our 35th Reunion, and I hereby pass this on to the proper authorities. He did not mention his probable attendance, though it is conceivable that he and Mrs. Aldridge will make it, as Fred is an old Massachusetts resident. Now for the report on another section, from the man who could well be the assistant for the Saint Louis area, our own **Ellis Littmann**. Ellis reported that he had just then finished a nice chat with the other **Henderson, E. C. "Slick,"** also of St. Louis. It appears that Slick has several milestones behind him; one of his girls just got married, which is indeed a milestone, and Slick feels right now as though he were entitled to a breather. Slick can-

not relax 100% as he still has a boy in college (Westminster?), and a 14 year old daughter. Slick, see Woods and Bailey, and relax. He has recently served as chairman of the Career Day Program of the Mark Twain Institute, and this effort is a part of a series of meetings where Slick's function is to explain to young students the advantages of an engineering education, to help said students decide on engineering, or whatever, after being properly informed by competent advisors of which group Slick sure is one. Ellis then talked to **John Sweeney**, who has recently been made a fellow of the American Institute of Architects, which is really a top honor to any architect. From somewhere, it occurs to me that there are only around 100-odd "fellows" in the U.S.A. Ellis also hears from Dr. **James (Jim) Dunlap**; Jim is a coordinator of research and testing in the University City, Missouri, school system, which may appear to be getting far afield from engineering, but from Ellis we find that this field of endeavor is very closely related to engineering and research. This research is the beginning of an effort to help children prepare for the more modern techniques and needs in our educational system. Jim also is attempting to influence children in their early reading studies, working with the 44 basic sounds in the language. Ellis picked up quite a fine story from Dr. Jim, and we appreciate having it, in spite of the fact that the total discussion had to be forestalled a bit. Ellis also reports on **Nathaniel Pope Green**, presently of Chesterfield, Missouri, a suburb of Saint Louis. Nat and Ellis did not get to talk with each other but Mrs. Green told him Nat is now with Conduccion Corporation, a subsidiary of McDonnell Aircraft, in St. Charles, another suburb. The Greens like the new town of Chesterfield and enjoy being away, way out in the green and wide open spaces. The **Mayers, Mal** and **Ellie**, stopped in to see Ellis and Ros in March. Mal is semi-retired, and on his way around the world, and, it appears, has moved to Washington, Maine (no other address needed). . . . Ros, daughter Susan, and Ellis had just returned from a ten day trip to Freeport, Bahamas, to look over a piece of real estate now owned by the Littmanns. Son Ron, complete with new wife, is now living in Boulder, Colorado, and they expect to stay as he is engaged in real estate construction. Gee, I always had the idea one might well be ready to leave fast, in that business. Only incidentally, Walt Skees writes from Green Turtle Cay, that things are really booming. Walt, it seems, still is in his old vocation of professional engineer, when he finds the time. Ellis reports that he cannot locate **Heb Gardner, Jr.** Neither can we, Ellis, but I am still trying. . . . Another short letter comes from **Cal Mohr**, our Chicago man, who writes in connection with the Boston Patriots Day that Ken Bell used to trot over the marathon course to keep in shape for M.I.T. cross country. It seems that Ken Bell came back to the Institute, finished up, and eventually took a Ph.D. in Geology, which, by the book, makes Ken a member of some other class. However, anyone who could cover that 26 mile marathon course

deserves some mention in some part of this publication, and I will make it a point to write to Ken, and get his story for the Secretary of his graduating class. Cal says that the twister of late April, in the West Chicago area, did not touch North Aurora, but did hit Geneva very hard, indeed. I confess that I was pleased to hear that Cal was 8 big miles away from that horror. Cal has some news about a few from whom we hear only through Cal. It seems that he has returned from a trip to western New York, where he saw **Frank Twomey**, who is with the Electrochemical Division of DuPont at Niagara Falls. Frank says that, at a recent meeting of the local M.I.T. Club, he was the only classmate, and the guest of honor was our own Chairman, Jim Killian; what a shame that some organizer could not have thought to drum up just a little more interest from the Class of 1933. **Bob Smith**, Pfaudler Corporation, was only recently honored with a brand new granddaughter, and another Smith through his son; this is the first girl, but there are already three boys. Through Bob, we find that **Charles Payne** has recently been promoted to superintendent of the Eastman Kodak Paper Mill Division, a tremendously large operation when one considers the amount of paper of all kinds that Eastman makes for the photo industry. **Walt Swanton** has been appointed director of the Waste Disposal System Division of Pfaudler, and Cal seems to see Walt coming out to North Aurora, as Pfaudler has one of their systems in operation in or near that area. Through Cal, again, comes word that **Bob Dillon** is now quite busy getting a new plant of Union Carbide into operation in Taft, Louisiana, and, after this plant is on a going basis, Bob is to go to Chicago to visit another plant, and to see his daughter who lives in the area. Bob Smith reports of hearing from **Bill Rand**, Calif., but only that they seem to find no trace of **Mort Williams**. Incidentally, does anyone have any idea as to the whereabouts of **Gunter Kohlmann**, Course II, '33? Even the Register has lost track of him. Cal informs me that his firm has had many inquiries about filtration equipment to be used in the very popular stream pollution program, and that this demand may be the start of another traveling cycle. **Jim Turner**, Executive Vice-president of our Class, and also chairman of our coming Reunions, reports a meeting of his brand new committee at the Faculty Club, Cambridge, early in March. I did not report this earlier as a little of the material was, then, classified. The committee is (and a most distinguished one): **LeBurton D. Webster**, publicity; **Fred V. Murphy**, program; **Clarence R. Westaway**, arrangements; **Roger P. Congdon**, attendance; **George A. Stoll**, finance; and **Richard Warner**, registration. If anyone needs the address of one of these fellows, just drop me a line. It is to be hoped that a letter to the class from **Ed S. Goodridge** is by now already in your hands, and if so, you will have noted that, in all probability, we will all have to dig in for a five spot to help finance the Reunion, as the mailings to the Class, alone, will come to over \$500. That five is a very small annual contribution, spread over 35 years. With five let-

ters going out to the Class from either President Goodridge or Jim Turner, probably 200 post cards of the Chatham Bars Inn from the Secretary, countless letters to a wide list of classmates, and a Reunion mention in every set of class notes, this coming Reunion will be a big one, given a decent weather break, and it may well be the biggest ever. I have a short note from **Neil Hopkins**, of the Maine Hopkins' now living and working for York ICE, in York. Hop says that he doesn't see **Steve Crick** too often, though he does see **Walter Galazzi**, also with York, in the main New York City Office. One of Walt's daughters graduated from Pembroke recently. I was informed by the Register a few weeks ago of the death of **Edward W. Palmer**, Course VII. Ed passed away in June, 1966, of a very sudden heart attack. Mrs. Palmer was kind enough to give me a short sketch of Ed's life and work, though I am not sure I will have the story straight, chronologically. Ed spent most of his life in Community Council and Community Chest work. He received his M.P.H. from Harvard in 1946, went to Omaha's Community Council, then to St. Paul, where he spent eight years in his specialty. He then moved to Allentown, Pa. as executive director of the Community Council, and, when Allentown merged with Northampton County, he was with them as associate director. The Palmers lived in Coopersburg, Pa. at the time of Ed's passing. I know that all of you would approve of my expressing our sympathy and kindest wishes to Mrs. Palmer, and his two children, a son, 22, and a daughter, 16. We have a few of our usual address changes, though these are getting a little more scarce, as we catch up with the Zip numbers. Which reminds me, why not send in your Zip numbers? We need them. **Herbert S. Gardner, Jr.**, XV, formerly of St. Louis, now has a Chicago address. Also, we have changes for **Harold G. Conger**, and **Philip C. Rutledge**, both of Course I. Anyone may have any of these by asking ye scribe. . . . Having missed **Jose Calvo** in Mexico City at the time of the Club Fiesta, we now report on him from a letter just in. Jose has been, for years, with the Panamanian Embassy at Mexico City, in what capacity he says not. His hobbies are reading and stamp collecting, but "I am planning to play golf because my doctor recommends some exercise." He has two sons, 27 and 25, and the elder is an SM in civil engineering from Texas University; and the younger is also a civil. . . . I almost brought down the full ire of **Lou Alpert**, by asking for news twice inside of four months. It was an oversight, Lou, and I promise to use your life story early next semester. Golly, what a pleasure it would be to have to apologize to a hundred or so fellows who wrote me a second time to chide me for a mental lapse. A letter has just come in from Elizabeth Brown Bell, the good wife of **Harry H. Bell**, who took a masters from M.I.T. in 1933, Course XV. Harry has been a victim of multiple sclerosis for 25 years, and has been confined to a wheelchair for the last 15 of these years. Harry came to M.I.T. from Nova Scotia Tech and Dalhousie University, Halifax, Nova Scotia, having

picked up his bachelors degree along the way. He took a masters from M.I.T. The Bells have two sons; Michael is in London, England in the Canadian Diplomatic Service (in Bob Winters' Department of Trade and Commerce). The other son, Roger, is with I.B.M. in Montreal. Both boys are graduates of Queen's University of Kingston, Ontario. She mentions no grandchildren. The Bell's address is 240 Kindersley Avenue, Town of Mount Royal, Montreal 16, P. Q. Canada. Course VI folks will be pleased to hear from two of the old familiar gang. I find one of them hiding behind the Mathematics Department, M.I.T. where he is a professor and a doctor of science—**Norm Levenson**. Norm's two daughters are both married to Class of 1961 men; Sylvia to Mike Remler, now a Resident in Neurology at Stanford Hospital, and Joan to Tom Sherman, now an assistant prof. of math at Brandeis. The Levinsons also have three grandchildren, which gets Norm into the club with a bang. Norm has recently returned from the International Math Conference in Moscow. The other Course VI fellow is **Theron Johnson**, who has been with General Electric since 1933, and is in charge of the mechanical design and advanced engineering of hydroelectric equipment (generators). Theron announces that they still have a long way to go in the old fashioned(?) 60 cycle design, and wonders if computers are really here yet, in spite of the publicity. The Johnsons are going on a long and well deserved vacation trip next December and January, and so probably won't make the 35th in June 1968. . . . And from **Arra Steve Avakian** we await with pleasure the promised much longer letter. He announces that he has gone back to his original name, Arra, which he dropped for simplicity many years ago to become Steve.

From Cornell University comes a fine letter from **Frank F. Gilmore**, Course XV. With these notes due to be mailed shortly, I will condense Frank's story, with a promise to elaborate at a later date when material is not so bounteous. Frank is professor of business administration in the graduate school, teaching a course in business policy and another in international business policy. He also directs the Executive Development Program, in cooperation with many business firms. The Gilmores have a married daughter living in New York City, a married son living in Ithaca, and an unmarried son living in Rochester, N. Y. Now, here is an attractive feature; they built, two years ago, in Cotuit, Mass., a Cape Cod cottage, after searching for the right spot via sailboat for five years. And Cotuit is only about 25-30 miles from Chatham Bars Inn (1968) and is on the same south side of the Cape. Any sailors desiring a chance to practice their hobby might well get in touch with Fred Murphy, the chairman of the Reunion Program Committee. Now, folks, as a final, and cordial reminder, the summer address of your Secretary is as given below, my home is located nine minutes from the N. H. Turnpike, street address Rte 85, Newmarket Road. For those who really intend to make a phone call, dial 772-2333, or 772-3146, or 964-8304 (week

ends only). I also suggest that, if you do intend to make a phone call, turn off the Pike at the Exeter-Hampton Interchange to find a phone, for if you pass this turnoff, you can't get off for eight or nine miles more. And 35th Reunion, June 1968, Chatham Bars Inn. Most Sincerely,—**Warren J. Henderson**, Secretary, Drawer H, Exeter, N. H. 03833

'34

News is so scarce that this Secretary has to stoop to writing about himself. I made a 14 day trip with my daughter during her spring vacation. We set foot in 14 Mediterranean countries of Europe, Asia and Africa. **Hank Backenstoss** met us at the airport in Beirut where he was also attempting to expedite mail to Saudi Arabia by handing his mail to air travelers to those parts. Hank and Nicky and 10 year old daughter, Martine, live in an elegant and spacious apartment. Hank and family lived seven months in Saudi Arabia and even at that time four year old Martine was the interpreter! Today she is at home in English, French or Arabic. Her school Arabic notebooks are works of art. Though Hank lives in Lebanon, he makes many trips to Saudi Arabia, for his main work is that of consultant to that government on all aspects of electric power generation, distribution, maintenance and rates. He has teams of employees in different cities, some technicians being Lebanese, some Saudi, and some American. One power plant in this program will be in Jedda. Besides generating 50,000 KVA it will produce 5,000,000 gallons of clean water a day. This will be infinitely better than that brown stuff called water which now comes from wells 3000 feet deep which draw water which was laid down in glacial times!

Dan Strohmeier continues to amaze sailing circles. In 1954 he won the Newport to Bermuda race in his *Concordia* yawl. That was fitting for the head of Bethlehem Shipbuilding which turned out over 1000 ships for World War II. However, in February he won the Larchmont Yacht Club's (dinghy) frostbite regatta. Such a race is for the younger, harder age as a rule. Well, he had a high school senior girl on board to supply the youth, but you can bet he was called on for plenty of hardy effort. **Jinx Callan**, who was once our only Class Secretary and who should be congratulated in retrospect for that hard work, is today also a sailor. He keeps his beautiful 35 foot sailboat at Barrington, R. I. and offers it for charter now and then. **Mal Stevens** writes that his daughter, Beryl, will go to England this summer, after having completed her sophomore year at Jackson. She will be a volunteer exchange social worker. —**James Eder**, Secretary, 1 Lockwood Road, Riverside, Conn.; **George G. Bull**, Assistant Secretary Middle Atlantic, 4961 Allan Rd., Washington, D. C. 20016; **Norman B. Krim**, 15 Fox Lane, Newton Center, Mass. 02159; **Kendrick H. Lippitt**, 8735 Delgany Ave., Apt. 211, Playa Del Rey, Calif. 90291; **W. Olmstead Wright**, 1003 Howard Street, Wheaton, Ill.

'36

Through the Alumni Office I have been informed of the death of **William W. Prichard** of Upper Montclair, New Jersey on April 11, 1967. I have no further information at this time and will appreciate anything further from any of you. . . . **Dorian Shainin**, a vice-president of Rath and Strong, Inc., of Boston, addressed the Merrimack Valley Section of the ASQC in Andover in March. **Al Bagnulo** is with Pope, Evans and Robbins, 515 Wythe Street, Alexandria, Va. 22314, and **John Rowell's** address is 20 Curtis Road, Middlebury, Conn. 06762. . . . Your Secretary expects to spend the summer between Winchester and West Hartland, Conn. (telephone listing under Winsted) and she will be glad to hear news of any of you who are traveling this way.—**Alice H. Kimball**, Secretary, 20 Everett Avenue, Winchester, Mass. 01890

'37

Joe Heal, our Class Treasurer, informs me that the response to the request for class dues has been excellent. Also, **Len Seder** was very pleased about the returns of the class questionnaire and promises some very outstanding results. **Jack Simpson** was not able to make the reunion and sent his regrets. **Chris Dreyer** also was not able to make it and sent his new address, Route 1, Box 633, Grass Valley, Calif. 95945. **Nancy Klock** was not able to attend as her son was getting married on the 10th. **Ed Hobson** sends his greetings and best wishes to all, along with his regrets. **Bob Ferguson** also sends his regrets and vows that he will make the next reunion. A total of over 50 members of our class, with their wives, plan to attend our 30th reunion. A full report will be given in the first issue of the Review in the fall.

Leo Moore and **Herb Goodwin**, who are associated with the Alfred P. Sloan School of Management, have edited a new book, *Management Thought and Action*, which has just recently been published. Have a pleasant summer and send a card to your Class Secretary.—**Robert H. Thorson**, Secretary, 506 Riverside Ave., Medford, Mass. 02155. Professor **Curtiss Powell**, Assistant Secretary, Rm-5-325, M.I.T., Cambridge, Mass. 02142; **Jerome Salny**, Assistant Secretary, Egbert Hill, Morristown, N.J.

'38

Bill Roper has been appointed Brigadier General on recommendation of President Johnson, and named Ohio River Division Engineer, with headquarters in Cincinnati. For three years Colonel Bill had been District Engineer at Louisville, where a part of his assignment involved working with programs of the Wabash Valley Association. "Colonel Roper's new assignment will again tie him closely to our association," said the president of the

Coles County Chapter of the WVA, "and we are more than happy to know we have a friend in such a position to help us on development of the Lincoln Reservoir and the proposed recreation area." Bill had been responsible for a number of water management projects, including also the development of the Little Wabash, Skillet Fork, and the Saline Rivers. In his work in the Wabash Basin he was tremendously effective in dealing with the citizen groups, was a sought-after speaker at conservation meetings, and frequently introduced with such accolades as, "Colonel Roper has earned a reputation as being one of the finest 'hearing conductors' in the business, and WVA is proud to have him take part in its annual meeting!" Bill left Louisville last summer for a short assignment as executive director of civil works in the Office of the Army Chief of Engineers in Washington, before returning to the Ohio and Wabash country.

"I continue to be occupied with various ill-defined responsibilities as assistant to the president of Lockheed," **Bill Whitmore** reports. "The job still leads me to Washington about once a month on a number of interesting tasks. For the past year I have been officially a consultant to the Defense Science Board. During the year I picked up my third "Certificate of Commendation" from the Secretary of the Navy for assignments in connection with the Polaris Missile Program. This one had a little more ceremony connected with it since Admiral Levering Smith, Director, Special Projects Office, made a personal presentation to me in his office. As a member of the Lockheed Research Council I enjoyed a visit to the Institute last March for discussions of mutual interest in the field of Research and Development. The Institute people who are responsible for liaison with industry set up a very good day's program for us, and the entire council (most of whom had some M.I.T. background) found it most worthwhile. We had a similar meeting with Caltech in June."

Jack Williams, who received his M.S. with us, has been appointed to the newly-created Texaco post of assistant manager, Port Arthur area. He had been general superintendent of Port Arthur Texaco Plant. Jack has had a good look at the diversity of Texaco's operations, with earlier assignments in New York, San Antonio, West Tulsa, Lockport, and at the Process and Production Division of the Refining Department headquarters.

Describing Lockheed-Georgia's C-141A *StarLifter*, **Bill Shuler** presented a paper at the SAE's 1966 Aeronautic and Space Engineering and Manufacturing Meeting, and then prepared an adaptation "A Study in Structures" for the *Lockheed-Georgia Quarterly*. Bill is chief structural engineer for Lockheed-Georgia. "The relative position of the C-141A is even more impressive when it is realized that the *StarLifter* is a high performance military logistics transport, and as such incorporates provisions for aerial delivery of cargo and troops as well as a complex military cargo floor," Bill pointed out. With a structure accounting for only 27 per cent of its gross weight, the C-141A weighs in more like a civil transport than a military

vehicle, and represents a design class based literally upon flexibility. As such, fatigue studies become most important, and Bill reviewed the intensive design and study program to keep on construction schedule and to lead the vigorous operational schedules after first deliveries. Critical areas were identified as pressurization loads on the fuselage, and flexure in the wing.

"Major attention in fatigue loading is still placed on the primary wing structure," Bill emphasized. "The importance of the ground-air-ground cycle and low and high altitude flight in turbulence continues to be emphasized. Even then, it is very difficult to meet anticipated fatigue requirements with a wing proportioned to static parameters alone."

The flight test program utilized 34 transducers to document acceleration, bending moment, torsion, and shear! Current assignment for Bill is to apply these techniques to the C-5A—a plane 2.5 times as large, based upon such technologies as titanium, fiberglass laminates and sandwiches, integral construction, chemical milling, and controlled interference fasteners!

Nowhere in this discourse is there one hint that Bill is also an expert in tomato culture, from which he developed a most keen sense of skin stress, elimination of stress concentration and extension of fatigue life, not to mention damage tolerant design. He did mention that he has had to look elsewhere, however, for design data on the new materials of construction.

Bob Gordon has what may be the job-of-the-year, as vice-president of Castle and Cook, Incorporated in Honolulu! The company is primarily a management agency, Bob says, with Dole Corporation and Bumble Bee Sea Foods as wholly owned subsidiaries, together with a number of additional interests and activities.

Spring comes late in Rochester (if it chooses to arrive at all this year), and there is something mighty compelling about Hawaii.

Al Welling, West Point '33 and M.I.T. '38, retired as Major General and is now vice-president of Wyandotte Chemicals Corporation as division engineer, U.S. Army Engineer Division, South Atlantic. Al was responsible for the planning and construction of missile launch facilities at Cape Kennedy.

Belatedly we note that **Bill Cook** received the 1965 Elmer A. Sperry Award for his part in the concept, design, development, and production of Boeing's high-performance subsonic transports. Bill shared the award with four other engineers, including Richards Loesch, '39, and John Steiner, '41.

Not so belatedly, have you set up your 1968 schedule to include REUNION on June 8-9? Pamper yourself, as Madison Avenue suggests: plan to arrive Friday, June 7 for a running start, and treat yourself to Alumni Day on Monday June 10. This will be positively the only 30th REUNION presented by the Class of 1938! —**Frederick J. Kolb, Jr.**, Secretary, 211 Oakridge Drive Rochester, New York 14617

'39

Biggest news this month is from The Boeing Company, contained in a letter from **Richards L. Loesch, Jr. (IX-B)**. Dix wrote that **Holden W. Withington (XVI)**, has recently been made vice-president of the Boeing branch in charge of the entire Supersonic Transport Program. (Perhaps you read of that appointment also in recent national magazines.) Along with Bob, representing '39 in the upper echelons of Boeing are the following: **Ted Snow (XV)** as manager at Boeing-Huntsville, **Johnny Alexander (XVI)** as assistant chief engineer for product development of the SST; **Hans Bebie (XVI)** as project engineer—system integration and configuration development for the SST; **Jim Barton (XV)** as assistant director—international operations and planning, and Dix himself who is director of flight operations for the company. . . . Public Service Electric and Gas Company, of Newark, N.J. recently announced that **William A. Smith (VI-A)** has been promoted from operating engineer to substation engineer at the PSE General Office. Bill lives at 704 Upper Boulevard, Ridgewood, N. J.

There is one death notice this month: **Joseph Bayer (X)**, of 609 Highland Street, Middletown, Ohio, in October, 1966. No further details, but the 1961 Alumni Register listed him as product engineer, Goodrich Rubber Company, Akron. Our sympathies to his family.

Does anyone have any word of the following, who are being dropped from the M.I.T. rolls because of no news of addresses since leaving the Institute: **Robert W. Pastene, Robert C. Demange, Charles F. Churchard, Arnold B. Ellison, Miss Gertrude M. Fleming, Brainard T. Macomber, William Hawley, David R. Preston, and Raymond M. New, Jr.?**—**Oswald Stewart**, Secretary, 3395 Green Meadow Circle, Bethlehem, Pa., 18017

'40

It is with regret that I must report the death on November 20, 1966, of **Arnold Smith** who was associated with us in Course XV during our sophomore year.

Dave Morgenthaler, President of Fosco, Inc., Cleveland, Ohio, has been elected secretary of the Young Presidents' Organization. . . . **Jackson Graham** has been appointed General Manager of the Washington, D.C., Metropolitan Area Transit Authority. **Herb Hollomon** was the principal speaker at the launching ceremonies for the *U.S. Fairweather* and *U.S. Rainier* in Jacksonville, Fla., on March 14, 1967. Mrs. Hollomon acted as sponsor of the *U.S. Fairweather*. The boats are designed for charting U.S. coastal waters.

By the time these notes are read, **Julius Molnar** will have received an honorary doctor of science degree from Oberlin College. Julius is executive vice-president of Bell Telephone Laboratories and has done work in electron tube development

and military systems development. . . . **Ralph Thompson** has been appointed vice-president and general manager of the Chemical Specialties Division of Calgon Corporation. Ralph has been an officer of Calgon since 1963, and originally joined Calgon in 1948 as a staff engineer, and was later director of research and engineering.

I hope all of you have a pleasant summer and have time during your vacations to drop your Secretary a line. For myself, I plan to go to Expo '67—**Alvin Gutttag**, Secretary, Cushman, Darby & Cushman, American Security Building, Washington, D.C. 20005

'41

Martin Mann has been recently promoted to text director of Time-Life Books, the book publishing division of Time Inc. Martin joined the company in 1965 as editor of the *Life Science Library*. Prior to that he had been manager of the Adult Trade Books Division of the Thomas Y. Crowell Company after 16 years with *Popular Science Monthly* where he held the position of senior editor. Among publications of which he is the author are: *Peacetime Uses of Atomic Energy* and *Revolution in Electricity*, both published by the Viking Press, and *How Things Work*, published by T.Y. Crowell. During 1965 he served as president of the National Association of Science Writers (NASW) and is presently secretary-treasurer of the Council for the Advancement of Science Writing (CASW). He resides at 24 Fairview Avenue, Madison, N. J., with his wife Eleanor. . . . **Charles Wyckoff** is credited with having invented a new color film which cannot be exposed erroneously. The December 5, 1966, issue of *Technology Week* reveals it as an extended range color film which goes beyond the XR type. Charles says that as yet it exists only in experimental coatings for



David T. Morgenthaler, '40

Edgerton, Germeshausen and Grier in the event it is needed for documentation of nuclear blasts and for astronauts to use on the moon. He says that he tested the film on recent solar eclipse recordings in Brazil. At present the film is a color reversal (transparency) film as a negative material. The color reversal film is such that dim subjects will be seen as good exposures if the light illuminating the developed transparencies is bright, while bright subjects will be seen as good exposures if the light on the transparencies is dim. Charles' career has been devoted to the supervision for EG&G of the photography of the U.S. nuclear bomb tests. Nuclear explosions happen so fast that it is impractical to adjust exposure to their varying light intensities. Charles reasoned that a multilayer film would help and to that end had special color negative emulsion in three panchromatic layers, each of greatly different speed. Thus in an intensity range of 10 million to 1, there is bound to be an exposure on one of the three layers. Selective color filters enable the photographer to pick off the layer or combination of layers for a good print. Negatives made with this film are called XR (for extended range) and have appeared in the photo press and in *Life* magazine, and the film has been available commercially from EG&G for some time. The problem is that though this XR uses the color negative idea, it is really a black-and-white (or more properly, a monochromatic) film. Charles' new idea goes beyond this XR to an extended range color film. . . . **Dr. Albert C. Zettlemoyer** has become the first "vice-president for research" in the 101 year history of Lehigh University. He has spent 25 years in research and teaching at Lehigh. . . . The M.I.T. Class of '42 has asked to be mentioned in this column as having compiled a detailed directory of case histories on its members, wives and families, copies of which are being placed on public sale at \$10 each to help defray expenses of its 25th Reunion this June. Those interested in purchasing a copy may write to Lou Rosenblum, '42, Book Editor, c/o The Academy of Applied Science, Hotel Continental, Cambridge, Mass. 02138.—**Walter J. Kreske**, Secretary, 53 State Street, Boston, Mass.; **Everett R. Ackerson**, Assistant Secretary, 16 Vernon Street, South Braintree, Mass.; **Michael Driscoll**, Assistant Secretary, 63 Centre Street, Nantucket, Mass.

'42

This will be the last time I will write this column for the class. I have been doing it for the past five years as some of you may remember, and after two hitches as Class Secretary (although not consecutive), I have asked **Jerry Coe** to have someone else elected at our Reunion. . . . By the time you read this, our Reunion will have been over, and I know it will have been a great success. I wish whoever continues this column the very best of success with it, and I express my great appreciation to the excellent data collection service run by the Review staff. I hope I will have

seen you at the Reunion. Good luck to all.
—**John W. Sheetz**, Secretary, 45 Rutledge
Road, Belmont, Mass. 02178

'44

James S. Mulholland, Jr., President of Hayden Publishing Company, Inc., New York, N.Y., held open house on March 29 for the children—his own and those of his employees. The *New York Times* found the idea sufficiently interesting to send a reporter and photographer resulting in a feature the next day with four pictures and many quotes. Jim is quoted as saying, "I got the idea for the tour from a sociological report I read a few years ago. It theorized that middle-class delinquency, particularly among boys, stems from their not knowing what their fathers do and not having a model to pattern themselves after." Among the 40 children present were Jim's 6-year-old son, James 3d, and his 4-year-old daughter, Marie. Now there's an idea for all our other enterprising classmates. If you don't own the business you can suggest the idea to your boss. Get the newspaper to send a reporter, and then be sure to clip the story and send it to the undersigned. Incidentally, M.I.T. was not mentioned in the *New York Times* article so the story was not detected by the clipping service. An unidentified friend of M.I.T. spotted the article and sent it to the Review editor who in turn forwarded it to me. Many thanks. . . . **Eugene W. Sard**, 94 Harriet Lane, Huntington, N.Y., had a picture and biographical sketch in the *IEEE Transactions*, Microwave Theory and Techniques for last December but the clipping (fragmentary) does not indicate the event. Eugene is a consultant with Airborne Instruments Laboratory, Melville, N.Y. . . . **Dr. Richard A. Craig**, Professor of Meteorology at Florida State University, has been honored by being elected a Fellow of the American Meteorological Society, according to a clipping of March 15 in the *Brockton (Mass.) Enterprise and Times*. Richard graduated from Harvard in astronomy then moved to M.I.T. in time to get his master's degree in the year that most of us received, or were scheduled to receive, our bachelor's degrees. At the time of his subsequent graduation he was one of the youngest ever to receive the doctorate. Richard is the author of a 509 page book *The Upper Atmosphere: Meteorology and Physics* published in 1965. He and his wife, the former Connie Arnold of Abington, Mass., have a son, Malcolm, graduating from Harvard this year. . . . **Al Picardi**, President of the M.I.T. Club of Chicago, was scheduled to and presumably did represent the Institute at the inauguration of Dr. Rolf Alfred Weil as third president of Roosevelt University on April 16. . . . **Malcolm G. Kispert**, Vice-president of M.I.T., and treasurer of our Class, is involved in arranging for the Sixth International Symposium on Rarefied Gas Dynamics to be held at M.I.T. July 22-26, 1968.

We have this month a most unusual item: a letter from a classmate. He is **Frank J. Huddleston**, presently working



Commander Samuel M. Moore, Mr. and Mrs. Charles A. Patterson, Mr. and Mrs. R. MacLathlin, Mr. and Mrs. Gerald V. Quinnan, Mr. and Mrs. Thomas J. McNamara and Commander Moore's wife (left to right), are seen here in the Three Crowns dining room of the Princess Hotel in Bermuda where they had an unofficial M.I.T. reunion. Mr. and Mrs. John M. Schuman (not seen in this picture) also attended. They are all from the Class of 1945.

for Research Analysis Corporation and located with the U.S. Army in Heidelberg, Germany. Frank has six children, four boys and two girls, ranging in age from three to 15. He says, "Five of the children attend German schools where they are indistinguishable from the German children except perhaps by their size; we Americans tend to be bigger than the Germans." He says the largest man's shoe size which is readily available is too small for his 13 year old son. With regard to his work, Frank says, "The Army is experimenting with the use of real-time computers in their tactical operations, and I am part of that experiment. I still go out in the field in an Army uniform (although I am a civilian), experience gas attacks, etc.

Upon my return next year to the United States I plan to return to M.I.T. to brush up on the latest techniques in Operations Research. Perhaps I'll have some of my old classmates as professors." Frank would like to compare notes, particularly with those classmates who went into the Army in the summer of 1943. His address is TOS Development Group, ADFSC—RAC, APO New York 09403. Frank, if you'll mention some names, I'll furnish addresses but our records don't show which members left school when. It would be great if you could carry on some individual correspondence the way Cal Mohr does for Warren J. Henderson, Secretary of the Class of '33. Writing the notes is enough for me without performing the direct correspondence which really should be done.

Now we come to what might be considered official class business. **Burt Bromfield**, our 25th Reunion Chairman (see November Notes), called a committee meeting for April 13. The meeting was apparently postponed and actually held on April 16 at the Faculty Club. The following were present: President **John Hull**, Class Agent **Norm Sebell**, **Stan Warshaw**,

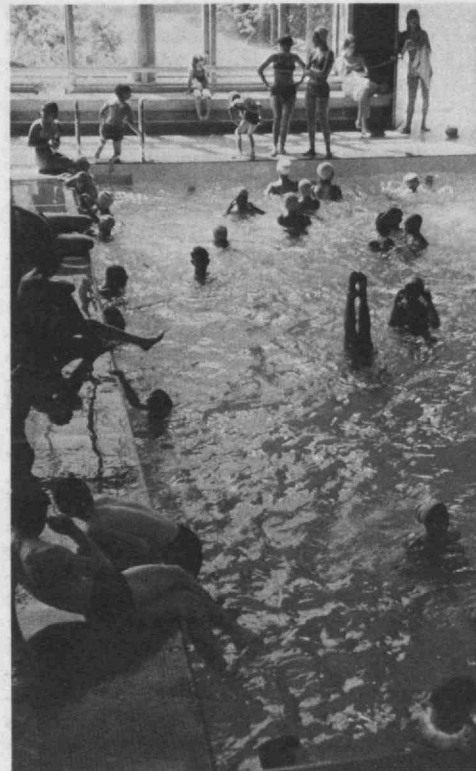
Pete Matthews, **Bob Breck**, **Jay Martin**, want to especially thank **John Hull**, **Paul Heilman**, **Dick Kulda**, **Bob Veitch**, **Burt Bromfield** and **Frank Huddleston** for their letters, notes, and minutes. Now let's look ahead. When this July issue is distributed, some of you will have already taken your summer vacation. Get your wife or one of your children to tell your Class Secretary about the delicious breakfast that you cooked over that campfire in the woods of Ontario while camping out on the way to Expo '67. If you haven't yet gone on vacation, resolve to phone a classmate along the way and get him to write to me by August 31. If you come to Washington or go to New York have your wife or child spend a dime to call one of the undersigned. I think you'll feel better for it. Anyway have a good summer.—**Paul M. Robinson, Jr.**, Secretary, Information Systems Branch, Office of the Chief of Naval Operations (Op-90F), Pentagon 4D683, Washington, D. C. 20350, 202-695-0351 or 7710 Jansen Dr., Springfield, Va. 22150, 703-451-8580; Assistant Secretaries: **Paul M. Heilman**, 2d, Copper Development Association, 405 Lexington Ave., N.Y. 10017, 212-867-6500 or 30 Ellery Lane, Westport, Conn. 06880, 203-227-3467 and **Dr. John G. Barmby**, IIT Research Institute, 1200 17th St., N.W., Washington, D. C. 20036, 202-296-1610.

'46

Robert E. Latimer of American Cryogenics Inc., an affiliate of Standard Oil Company of New Jersey, has written an article for the February, 1967 issue of *Chemical Engineering Progress* entitled "Distillation of Air." He joined American Cryogenics in 1962 as director of research and process engineering. **Ray H. Zarmer** of Arlington Heights, Mass., is a director of
(Continued on page 112)



The strangeness of emptying the car, sending the kids off to Burton House, and breaking the ice at the early arrivals' bar made the first hours on June 9 the longest for the 25th reunion Class of 1942 in Baker House. By Saturday morning, C. Stark Draper, '26, found an attentive audience in Kresge Little Theater, everyone relaxed at President and Mrs. Johnson's garden party and the traditional faculty luncheon, and the youngsters explored the campus and found the Alumni Pool.



manufacturing engineering and a member of the executive staff of the Appleton Electric Company. He addressed the Baha'i House of Worship in Wilmette January 29th on the subject "What is Baha'i Faith?" . . . United Aircraft Corporate Systems Center announced that **John A. Gautraud** has joined them as executive assistant to the division president. His previous experience includes working for the Avco Space Systems division as a development and engineering director and as assistant director of the Instrument Laboratory at M.I.T. . . . **Dr. Thomas F. Malone** has been designated as chairman of the National Motor Vehicle Safety Advisory Council. The Advisory Council will work with the Secretary of Commerce and the Secretaries of Transportation on automobile safety standards. Dr. Malone presented the third in a series of lectures at Hall High in Hartford. The theme of the lectures was "Focus on the Future." Dr. Malone discussed "Reflections in an Era of Change." He is the vice-president and director of research for the Travelers Insurance Company in Hartford, Conn. . . . At the 48th annual meeting of the American Geophysical Union in April, **William F. Brace** was a program chairman on the topic of Tectonophysics. He is a member of the Department of Geology and Geophysics at M.I.T. . . . **Robert J. Campbell** is president of the Link Group of General Precision, Inc. He has announced a new division of Link—the Link Information Sciences—a computer applications organization. . . . **Mason I. Lappin**, President of Lappin Bros., has been appointed as the Special Gifts Class Chairman of the Boston area for the Alumni Fund of M.I.T. Mr. Lappin is a member of the Master Plumbers Association and chairman of the Plumbing Industry Joint Conference Board. His address is: 54 Corey Road, Medford, Mass. The Special Gifts Chairman for the Alumni Fund of M.I.T. for the Wisconsin area is William H. Shield, Jr. of Milwaukee.

The Navy Air Systems Command Metallurgy division is probing the relation of material behavior and deformation processes to problems of metal fabrication. **Dr. W. A. Backofen** is the investigator of Deformation Processing of Anisotropic Metals at M.I.T. . . . **Dr. S. H. Crandall**, a professor in the Department of Mechanical Engineering has co-authored an article for the *Journal of Applied Mechanics* entitled "Some First-Passage Problems in Random Vibration." The Board of Directors of the State Street Bank, Boston, elected **Warren B. Tegen** to the post of assistant auditor.

The following was a letter written by our foreign correspondent, **Bill Cahill** to **John Green**: "Dear John: Thanks so much for the enjoyable evening. Thought I'd make a contribution to the Tech Review again. I trust that your sidekick is back in the fold and certainly I wish to express my condolences to him and the family concerning the loss of his father. I see Bob Bried occasionally as we are both concerned with the same industry. Bob reports that the teflon lined dog feeder is selling madly. As a matter of fact, when I saw him at the F. W. Wool-

worth buying office in N.Y. recently he was wearing a teflon lined suit so that he could get out of tight places slickly. **Bob** (golfer) **Shearer** from up Montpelier way was at a convention and stopped in Los Angeles long enough to freeload an evening with us. Bob is the only guy I know who can one-up-manship me. He is involved as a new car dealer, boat dealer, ski resort developer, has 22 mills in Maine and was here buying a helicopter because he was tired of fighting that rush hour traffic in Montpelier, Vt. The night of our debacle was memorable so I decided to call another old '46er, **Henry M. Morgan**. Hank, as you might remember, was living in Honolulu at the time of Pearl Harbor. He went to prep school at Choate and thence to M.I.T. Hank married a Wellesley girl, Gwen, in '46 while still in the army. He returned to M.I.T., finished in course V, then took a masters and later a Ph.D in Physics. He became affiliated with the Institute Teaching and Fabric Research Lab, moving from there to KLH, where he has been these last few years. I chiseled dinner out of him at Locke-Ober's and he told me that as of April 17th he had been made President of KLH. For those of you who are uninformed, KLH is the outstanding manufacturer of audio home entertainment speaker and player systems. It is an operating subsidiary of Singer Corp. . . . You will recall that there was some interest by a few towards a mid 25th reunion in '69, perhaps to be held in Jamaica, Bermuda or what have you. I see that other classes are contemplating it, and I for one, would be interested. I think that it could have a very beneficial effect especially if we were to do some class gift planning at that time. Maybe you can poll others as to their interest. Very truly yours, Bill." See you all June 12th!—**Donald A. Hurter**, Secretary, Thomas W. Reed Company, 533 Commonwealth Ave., Boston, Mass.

'47

By the time this issue goes to press the 20th reunion will be pleasant memories and renewed acquaintances. . . . **Jim Prigoff** captured his sixth National Squash Tennis singles title by defeating Pedro Bacallao, a former Cuban champion. This was the third straight championship for Jim which certainly deserves our congratulations. . . . **Dr. William E. Kennel** has been promoted to vice-president of Amoco Chemicals Corporation. . . . **Ezra S. Krendel**, Professor of Statistics and Operations Research at the Wharton School of Finance and Commerce,



James B. Prigoff,
'47

has been appointed director of the school's Management Science Center. . . . **Hector Acebes** is an internationally known explorer and photographer. His activities since '47 have been dedicated to film productions such as "Bold Journey," "I Search for Adventure," "Expedition," etc. He was the first white man to reach and photograph the Guica Indians in Venezuela. His photographic record among this dangerous tribe was published in seven consecutive pages of *Look* magazine. For the past seven years he has been established in Columbia where he has a motion picture and still photography studio serving industry and advertising companies producing industrial films, theatrical and TV spots, and advertising photography. A notable contribution to his record of exploration was a year long one-man jeep trek across Africa from Dakar to Mombasa. **Bob Danner** has been named division procurement manager for Raytheon Company's Space and Information Systems Division. . . . **Edgar L. Pinel, Jr.** has been appointed director of the Corporate Research and Development Division of Mohasco Industries, Inc., Amsterdam, N.Y. . . . **Dr. John Truxal** has written a book published by McGraw-Hill called *Feedback*. Dr. Truxal is professor of electrical engineering and provost of the Polytechnic Institute of Brooklyn. . . . Here are some address changes. . . . **Henry J. Sandler**, 742 Carpenter Lane, Philadelphia, Pa. 19119; **Dr. Albert D. Perry, Jr.**, 10341 Mira Vista Drive, Santa Ana, Calif. 92705; **John H. Hanson**, Oakwood Lane, Valley Forge, Pa. 19481; **Paul C. Fletcher**, 5 Eastman Circle, Wellesley, Mass. 02181; **Abraham D. Woll**, P.O. Box 29, Callao, Peru; **Warren M. Spear**, 214 Lyons Rd., Basking Ridge, N.J. 07920; **Simon Smith**, Apt. 813, 1000—6th St. S.W., Washington, D.C. 20024; **Fred V. Paradise**, Apt. 101, 5700 St. Anthony Ave., New Orleans, La. 70122. Until the next issue, have a pleasant summer.—**Martin M. Phillips**, Secretary, 41 Avalon Rd., Waban, Mass. 02168

'48

Dr. Albert J. Kelley, Deputy Director of NASA's Electronics Research Center, has accepted appointment as dean of the College of Business Administration, Boston College. Dr. Kelley was a career naval officer prior to his assignment to NASA, and thus has the distinction of heading a business school without ever having worked for a profit making organization. He will continue as a special consultant to NASA. He is a member of several honor societies, a fellow of the Institute of Electrical and Electronic Engineers, and associate fellow of the American Institute of Aeronautics and Astronautics, and a vice-president of the Armed Forces Communications and Electronics Association. The Kelleys have three sons and live in Milton. . . . **Edward S. Frohling** has been appointed to the newly-created position of manager of mining and metallurgy business development of the Parsons-Jurden Corporation. He continues as



A "50 mechanical engineering" reunion in Tokyo: Nathan H. Cook, '50, professor of mechanical engineering at M.I.T., with Lt. Col. Jack E. Downhill, '50, USAF, entertained by hostesses and faculty members of Tokyo University on February 22; several of the Japanese present had spent a year or more in M.I.T.'s Mechanical Engineering Department.

vice-president of the same firm, which is a wholly owned subsidiary of the Ralph M. Parsons Company. He, incidentally, claims to be a lousy golfer, but redeems himself by being rather proficient in keeping score. Mr. Frohling, his wife Diane, and children Edward, Jr., Laura, and Matthew, live in Manhattan. . . . **William Hadigian** has joined State Mutual Life Insurance Company of America as an associate group actuary in the group permanent and pension actuarial department. He is a fellow of the Society of Actuaries and a member of the American Academy of Actuaries. . . .

Phil Bragar has just received a certificate for completing the 12 types of speeches which comprise the basic training of the Toastmasters Club of MITRE. . . . The following interesting letter was received from **Jack C. Page** shortly after he and wife, Imogene, went south of the border: "My wife and I attended the M.I.T. Club of Mexico City's 19th Annual Fiesta and had a really terrific time. They had a group of almost 100 from the United States, but I am sorry to say that we were the only representatives of the Class of '48. However, two members of the Class of '48 who reside in Mexico City, **James J. Rattray** and **Juan Grau Gonzales**, were in attendance with their wives.

The whole Fiesta and weekend was an outstanding success and all of us enjoyed it immensely. The program included a tour of the Anthropological Museum, luncheon in a restaurant where both Imogene and I, as well as several others, enjoyed fighting a bull, and a marvelous Saturday evening fiesta complete with floor show, including the leading dancers from the Folkloric Ballet. My wife and I definitely plan to go next year and Jim, Juan and I would like to see a pre-20th reunion of the Class of '48 in Mexico City. I know it is not too far from Phoenix so you and your wife should be able to make it. Let's start beating the drums for a good turnout next spring in Mexico City." Parece un buen idea. Quizás el año próximo. . . . **Donald M. Perkins** is with Raytheon at Wayland. He seems well equipped with hobbies. He plays trumpet with the Concord band, enjoys flying and camping and has joined the horsey set by getting a horse for his oldest daughter. Don and Beatrice have four children, Beverly 17, Barbara 14, David 12, and Bonnie 6. . . .

Willem H. Thorbecke is general manager of international operations of Mobil Chemical Co. He lists show riding, international affairs and Chinese art as hobbies. He and his wife Sonya have children Noel, 17, Johan, 14, W. Leif, 12, and

Christine, 8. . . . **Richard H. Gaunt** will retire from the Navy in July. He and his wife Judy have children Richard Jr., 14, John, 12 and James, 9. —**R. V. Baum**, Assistant Secretary, 1718 E. Rancho Drive, Phoenix, Ariz. 85016; **John T. Reid**, Assistant Secretary, 22 W. Bryant Avenue, Springfield, N. J. 07081; **Robert R. Mott**, Secretary, Kent School, Kent, Conn. 06757

'51

It is our sad duty to report to you that **Ralph Romano** died unexpectedly on May 24, 1967. Ralph had been living in Barrington, R. I. He was a vice-president of Entwistle Manufacturing Corporation and Vanzelm Association, both in Cranston, R. I. I am sure it is no surprise to learn that Ralph had been very active in community and religious affairs and had lent his leadership and enthusiasm to many organizations. I obtained a copy of the obituary from the *Providence Journal* and the woman who answered my request informed me that Ralph was very well known in the Providence area and that the community was stunned by his death. He had been exercising at the Y.M.C.A. when he was stricken. In addition to his wife Virginia E. (Betty Coyle), he is survived by six children (two sons and four daughters), a brother and a sister. A number of our classmates flew to Barrington to attend the funeral. Our President, Marvin Grossman, has sent a letter to Betty to express the deep sympathy of the Class.

Robert Barklay has been working on cryogenic propellant systems for the Saturn V Launch Complex 30 at Huntsville, Cape Kennedy, and now at the home office of Air Products and Chemicals. . . . From Keene, N.H., the newspapers report that **Peter Booras** has been granted a patent for an endless breadloaf baking machine. The ingredients are mixed, carbon dioxide added, and the dough is extruded onto shaped conveyor belts which pass through an electric field. The equivalent of eight hours output from a conventional baking oven can be cut off the end of the belt every half hour, but anyone who likes heel crusts is out of luck. One thing is certain, Peter will make a lot of dough from this invention. . . . **Allen Fonda**, still in the 5% bachelor minority, has been with Stevens-Chase Design Associates in Camillus, N.Y., an industrial design firm, as product planning manager since joining the firm in 1962. If you need any dental or hospital equipment designs, call on Al. . . . **Raymond Haak** is with U.S. Rubber and is working at the

Joliet, Ill., Army Ammunitions plant. . . . **George Haskew** joined the Hackensack Water Company, Weehawken, N.J., in 1965 and is chief engineer and assistant to the president. . . . **Rodney Huppi** has transferred to the Bakersfield office of Standard Oil Company of California where he is division stratigrapher. . . . **Harold Hurschmann** has been with Wyandotte Chemicals Corp. since graduation and is now assistant manager of the Bicarb and Calcarb plants. . . . Major **Bob Knopf** received an M.S. degree in engineering management at R.P.I. in 1963, and then completed Armed Forces Staff College in Jan. 1966. He was in Vietnam flying C-47's at the time of our reunion, and by the time these notes are published we hope he is safely home. . . . **Kenneth Kruger**, architect and engineer, is in Cambridge, Mass. . . . **Jerry Levine** is president of Mentor International, a consulting firm for the international electronics industry, and is in San Francisco when not on one of his frequent trips to Latin America, Asia, or Europe. . . . **Forest Monkman** recently moved to Milwaukee. No word on his new job yet but he can be found at 6479 Upper Parkway, Wauwatosa, Wis. . . . **John Morgenthaler** earned his Ph.D. in chemical engineering in '65 while working at the Johns Hopkins University Applied Physics Laboratory. His thesis topic was supersonic mixing of hydrogen and air. He is now with two other classmates, **Dan Magnus** and **Ernie Sanlorenzo**, at the General Applied Science Laboratories in Westbury, Long Island. . . . **Saul Neidleman** has been with the Squibb Institute for Medical Research as Senior Research Microbiologist since earning his Ph.D. in biochemistry from the University of Arizona in 1959. . . . **Samuel Rubinovitz** has moved to 3 Bowser Rd., Lexington, Mass., and is still with E.G.&G. . . . **Jack Sevier** is with NASA working on the Apollo program in Seabrook, Texas. . . . **S. T. Shiang** has returned to Cambridge with his family of five children after two years in Taiwan where he assisted in the construction of a 25 million dollar fertilizer plant for the Chinese government. He is with Badger Company, Engineering Consultants. . . . **Robert E. Burrell** is living in Phoenix and is marketing manager for Motorola Instruments & Control, Inc. . . . **Richard** and **Jean Clough** live in Albuquerque where Dick is dean at the College of Engineering at the University of New Mexico where he also obtained his Ph.D. . . . The **Frank Hearts** were victims of progress(?)—their house in Lincoln, Mass. was taken by the government because the area is being restored as Minute National Park and their house is an oldie. . . . **Joe Hodnick** is on the staff at the M.I.T. Planning Office. . . . **Ken Kopple** is an associate professor of chemistry at Illinois Institute of Technology. . . . **Dr. William R. Laidlaw**, another "5 per center," is vice-president research and engineering, North American Aviation, Los Angeles. . . . **Thomas** and **Faye Rebarchak** sent a very brief note from Wilmette, Ill. noting that Tom is with the Austin Company, Process Division. One other item explains the brevity of the note: children, Tom, 13, Steve, 12, Jim,

11, Anne, 10, Mary, 8, Nancy, 5 and Michael, 4—(who has time to write?). . . . **Gordon Powell** is a professor of metallurgy at Ohio State University where he has been for the past 10 years. His hobbies include antique cars, sports cars (for contrast?), and boating in the summer. . . . **George St. Pierre** is also a professor in the Metallurgy Dept. at OSU and was recently awarded the metallurgical engineering Outstanding Teaching Award. . . . **Capt. John Tazewell** is the Readiness and Training Officer, Staff, Commander Cruiser Destroyer Force, Atlantic Fleet, and his hobby is, of course, boating. . . . **Capt. Ed Thompson**, who was a grad student with us, just retired from the Coast Guard, and is living in Falmouth. . . . **Mark Smith, Jr.** was elected a vice-president of Texas Instruments; he is president of Geophysical Services, Inc., a T.I. subsidiary, and is manager of GSI's Science Service Division. . . . **Lou Tedeschi** joined the ranks of married '51ers in 1965 and commutes from Santa Monica to El Segundo where he works on orbit analysis for Aerospace Corp. . . . **Edward Tschupp** is a member of the professional staff at TEMPO. General Electric's Center for Advanced Studies at Santa Barbara, Calif. . . . **Carlton Walker, Jr.** is the assistant director of marketing at Air Reduction Company, in Murray Hill, N.J., where he is working on new product development. . . . **John Wassel** is senior technical assistant for marine operations of Esso Inter-American, Inc. in Coral Gables, Fla. . . . **Art Wasserman** and **Al Boltax** have been livening up the Pittsburgh area with the sounds of their string quartet. Art is manager of systems integration at the Westinghouse Astronuclear Laboratory and must like the job because he just bought his first house last year. . . . **Ken Weber** was transferred to the Kinston, N.C. plant of duPont. He is division engineer in the Construction Division and is expanding their Dacron plant facilities. . . . Have a pleasant summer, we'll look forward to seeing you in November! This month's notes were brought to you by—**Paul Smith**, Assistant Secretary, 11 Old Farm Rd., N. Caldwell, N.J. 07006; **Howard L. Livingston**, Secretary, 358 Emerson Rd., Lexington, Mass. 02173; Assistant Secretaries; **Marshall Alper**, 1130 Coronet Ave., Pasadena, Calif. 91107; **Walter Davis**, 346 Forest Ave., Brockton, Mass.

'54

Lou Goldberg is technical director of a ballistic missile target system project for Raytheon ("the free world's only ballistic missile target system," says Lou); and in February gave a paper at the Sounding Rocket Vehicle Technology Specialist Conference. The Goldbergs have two daughters, Laura and Toby. This year's chairman of the Ashland region M.I.T. Alumni Fund solicitation is **Gordon Smith**. Gordon is employed by Fenwal Incorporated in Ashland. We wish him the cooperation received by Herb Slater, our class Alumni Fund Special Gifts Chairman for the New York area. Herb was

cited for achieving 116 percent of the goal for his area, and our thanks to those classmates who supported him. . . . Another bachelor bites the dust! **Bill Eccles** wed Patricia Mae Paschal on May 6th in the chapel at University of South Carolina where he is presently director of the Computer Science Center, associate professor of electrical engineering, and faculty advisor in Preston Residence Hall. His bride, a graduate of Mississippi State College for Women (cum laude), is assistant dean of women and has nearly completed her requirements for a M.S. degree in mathematics. Best man was Dr. Thomas F. Jones, M.I.T. Class of '40 and President of the University of South Carolina. Best wishes to the newlyweds! . . . **Saul Arbarbanel**, Head of the Applied Mathematics Department at Israel's University of Tel Aviv, has spent recent summers consulting for Minneapolis Honeywell. Saul married a Boston girl whom he met in Israel, and they have two sons. . . . A delightful old home in Bedford, Mass. is occupying the spare time of Barbara and **Donald Marshall**. The Marshalls are currently adding a studio to the house built circa 1740. Barbara is particularly enthusiastic about the shrubbery (the property was formerly a nursery), especially a Norwegian Drooping Spruce trimmed to the shape of an elephant. Don is general manager for a Division of the Nuclide Corporation. . . . **Dr. Thomas Vasilos** has been named to receive the 1967 Ross Coffin Purdy Award, presented annually by the American Ceramic Society for an outstanding contribution to ceramic literature. The award-winning article, "Strength-Grain Size-Porosity Relations in Alumina," assessed the influence of various micro structure characteristics on the strength properties of aluminum oxide. Dr. Vasilos is manager of the Material Sciences Department at AVCO's Space Systems Division, where he has helped develop the metal honeycomb reinforced ceramics used in re-entry vehicle and rocket nozzles. He has also directed AVCO-sponsored research on the pyrolytic and vapor-phase synthesis of refractory borides, oxide whiskers, and elemental fibers.

Karl-Birger Persson is one of thirteen employees of the National Bureau of Standards recently honored with Department of Commerce Silver Medals for services of unusual value to the Department. Karl, Chief of the Radio Plasma Section, Radio Standards Laboratories, Boulder, Colo., received his award for contributions to the study of plasma mechanisms and the technology of plasma measurements. . . . **Robert C. Reid** has recently co-authored an up-to-date reference of methods and data for calculating physical and thermodynamic properties of gases and liquids, entitled "The Properties of Gases and Liquids; Their Estimation and Correlation." Bob is a professor of chemical engineering at M.I.T. . . . **Charles H. Prince** has recently joined Dixon Sintaley, Inc., and with wife Audrey, Bobby, 10, Debbie, 8, and Suzanne, 3, has moved to Stanford, Conn. . . . A new concept for structural testing using flights of the Apollo Applications Program was presented at the AIAA/ASME 8th Structural Dynam-

ics and Materials Conference in Palm Springs by **John Zyara**, an executive engineer at Kaman Corporation's Kaman Avidyne Division. The title of John's paper was "Space Launched Lifting Re-entry Vehicle Models for Testing Advanced Structures and Materials at Circular to Hyperbolic Entry Velocities." **Bard Crawford** has passed his general exams for a doctorate in Aeronautics and Astronautics, and is returning to M.I.T. in the fall to finish his thesis. Bard currently works at the Instrumentation Lab. . . . My special thanks go to Mrs. Ardis Wanberg for typing these notes this year. Those of you who are Course X will remember her as Ardis Forsey, Professor Harold Weber's secretary in 1953 and 1954.—**E. David Howes, Jr.**, Acting Secretary, Box 66, Carlisle, Mass. 01741

'55

Just a little news and an earnest request for more mail before we begin writing again in the fall. . . . **Richard Bergman** has joined Systemedics, Inc., of Princeton as vice-president; he continues as a member of the board of directors. This firm provides administrative and financial processing services to physicians, medical groups, clinics and hospitals, and Dick will be responsible for expansion of the business into other services and products for the medical profession. . . . **Bertram Newman** with his wife and two children have moved to Los Altos Hills since his appointment as planning coordinator and manager of shareowner relations for Watkins-Johnson Company of Palo Alto. . . . At Koch Supplies, Inc., Kansas City, Mo., meat-packing machinery suppliers both here and abroad, **Lawrence Starr** has been elected president having formerly served as vice-president. . . . Captain **Albert Preyss** is now at the USAF Academy in Colorado. . . . **Henrik Hagerup** is at RPI in the Aero Department. . . . **Gordon Pye** is at Berkeley. . . . As is **Vitelmo Bertero** who is professor of civil engineering there specializing in experimental mechanics and inelastic behavior of structures. . . . **William von-Arx** divides his time between M.I.T. and the Oceanographic Institution at Woods Hole. Forgive the lack of details which we just don't have. . . . **Dell Venarde** is in Wilmington, Del., and **Denny Shapiro** is in Boston (please note details below); and we're going to write Ann Landers if you don't write us.—Secretaries; Mrs. **J. H. Venarde** (Dell Lanier), 16 South Trail, Wilmington, Del. 19803; **L. Dennis Shapiro**, Aerospace Research, Inc., 130 Lincoln Street, Boston, Mass. 02135

'56

Tech Faculty promotions on July 1 included three class members elevated to associate professor: **Simon Moss**, Metallurgy; **Wolf Vieth**, Chemical Engineering; and **Bruce Wedlock**, Electrical Engineering. Incidentally, Wolf and Peggy are in Germany for the summer vacationing and

(Continued on page 119)

"After 1,000 Years of Thirst . . ."

How a computer engineer
remakes Malagasy villages
and learns about simplicity

By David L. Ketcham, '60

A visit to the first well site by President Philibert Tsiranana of the Malagasy Republic proved his interest in the new water resources being made available to his nation's villages by the AID project under the direction of David L. Ketcham, '60.

There is an old saying in Madagascar that once you have drunk deeply of her waters you will always return. After four years of living on this island I have come to find truth in those words. For her people are gentle and in their simple, uncluttered lives one sees contentment. The land has beauty and peace but also knows barrenness, and the people of the south are thirsty during the dry months of winter. Lack of water has been one of this island's major problems ever since the Polynesian settlers arrived here centuries ago.

It was this need that prompted the Malagasy government to request assistance from the United States after her independence from France in 1961. Following a preliminary survey, I was asked by the U. S. Agency for International Development to head a modest groundwater research project in the new republic. After four months of French language training in Washington, my family and I were sent to Tananarive, the capital, in February, 1963.

The government geological service was our point of contact, and the French geologist in charge proved to be very helpful. After taking several field trips we decided to set up the base of operation in Tulear, a town of 28,000 people located on the southwestern coast about 1,000 kilometers from the capital. This city is the government seat of Tulear Province which is the largest and most arid section of the island.

The program was to begin with only one percussion drilling machine. The Malagasy government was to provide personnel for training, fuel and all local operating costs. Objectives were to be threefold: to give on-the-job training in all phases of well construction, to establish a national organization capable of planning and implementing a community water supply program, and to provide potable water in communities where it was in short supply.

The American drilling equipment arrived in June and the American drilling adviser arrived in September. A week after his arrival the first well was begun

in the town of Betioky in the presence of the President of the Malagasy Republic, Philibert Tsiranana, and the American Ambassador, the Honorable C. Vaughan Ferguson. Fortunately a good aquafer was found at 105 feet and the field operation started successfully. During the well testing period, children came from all directions, stripping their clothes off as they ran to frolic under the flow of water. Soon every bush in the area was covered with freshly laundered garments. Village women had descended en masse to take advantage of the abundant free water. To call the activities of that night a celebration is to use an understatement. We simply called it the "Betioky Ball."

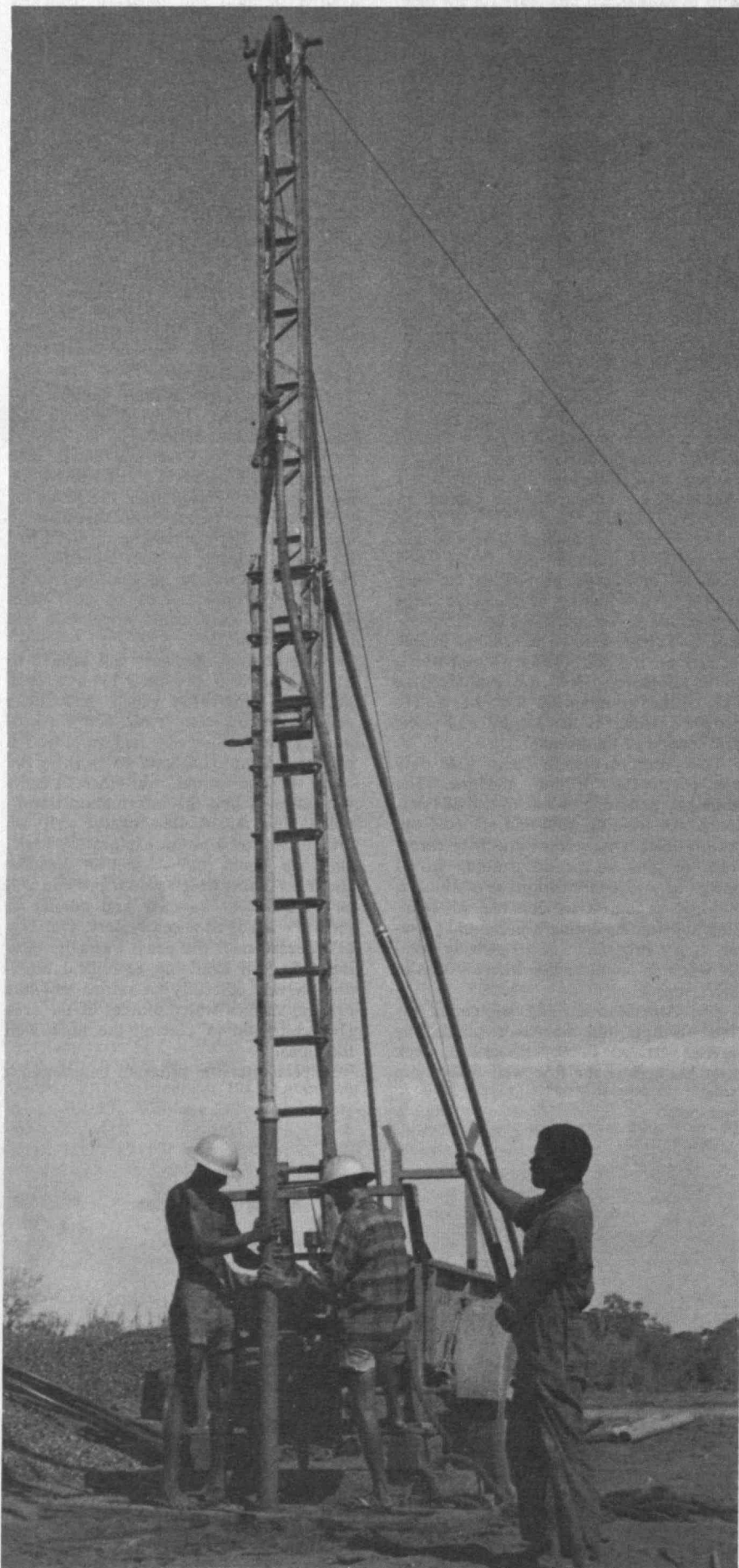
Technical Limitations

There is a very limited number of skilled personnel in Madagascar, and during those first months of the project we had to be both Chief and Indian. The American drilling adviser and I drove the big American trucks until the array of levers became more comprehensible to our drivers. The trainees we received had the desire to learn but they lacked a mechanical background, so they had to be taught the fundamentals of tool handling before they could cope with the drilling machine.

Basic groundwater data was limited to a few well logs provided by a French petroleum company which had been drilling on the west coast. The Government geological service had employed a private drilling contractor to work in the south of the island, but these results were meager and the information unreliable. This meant that every well we drilled had to be on an exploratory basis, and one could only hope an aquafer could be found which would provide water of sufficient quantity and quality to meet the needs of a community. Our biggest hazard near the coast was salt water intrusion. All available geological information was carefully examined and the existent surface water sources of the area plotted to aid in placing the final well locations.

A year after the program had begun a





second percussion drilling machine was purchased and a second American driller, Robert W. Dunn, arrived. He was hired by the Near East Foundation, a non-profit organization, which at that time was given responsibility for continuing the project. This transfer from AID to NEF sponsorship was effected smoothly with close cooperation and support given by U. L. James, AID Affairs Officer. Mr. Dunn had worked with a hydrojet technique on his last assignment and this simple method of drilling was introduced to Madagascar.

The original set-up used a tripod made of two-inch pipe with a pulley at the top. A pick-up truck was used for power. A rear wheel was removed and a "cathead" bolted onto the drum. A rope wrapped around the cathead was used to raise and lower the homemade drilling tools. Water was pumped through the drill stem to wash up the cuttings. The rig worked fairly well but had two serious drawbacks. It tied up an expensive vehicle and the fuel consumption was excessive for an economical unit. So we decided to make our own hydrojet rig, and I drew up plans for a self-contained unit which would have its own 28-foot telescoping mast and power source mounted on a two-wheel trailer. The cathead was to be driven through a surplus jeep gear box and rear end. This little unit proved to be quite satisfactory and a second one is now under construction. The Malagasy crews learned to use the rig in a short period of time and are able to jet down sixty-foot wells without much difficulty in the lateritic soil which comprises much of the island.

Pumping equipment has been kept as simple as possible. Pump jacks powered by gasoline engines are used in the larger communities while hand pumps are installed in the villages. We have found that standard U. S. hand pumps are not suitable for constant usage under local conditions. Designs for local fabrication are now being considered which would utilize roller bearings and reinforced handles. Village children and wandering cows have found hand pumps irresistible

This hydrojet rig, designed by David L. Ketcham, '60, and fabricated in Malagasy, turned out to be a simple and satisfactory solution to the problem of a drilling unit with which a relatively untrained Malagasy crew could put down 60-foot wells.

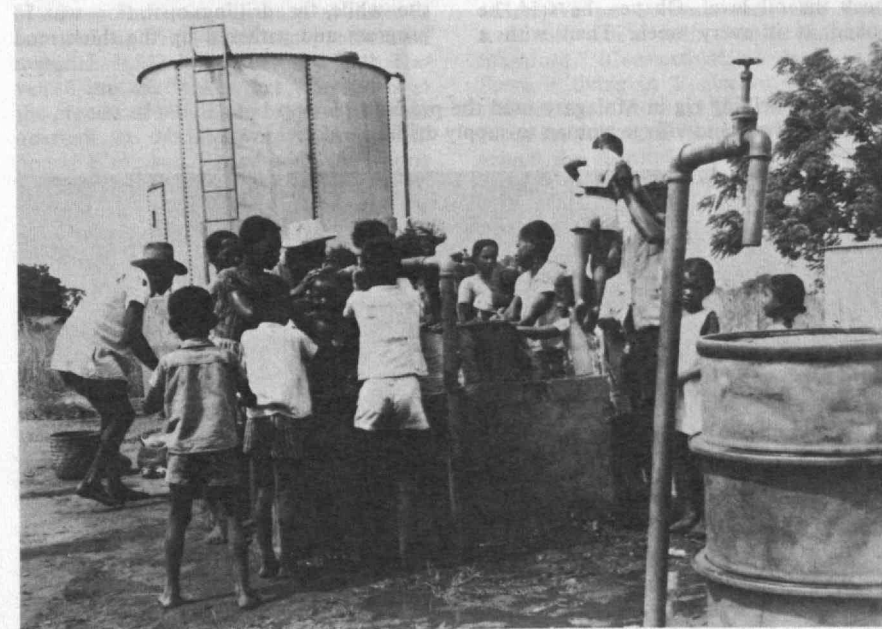
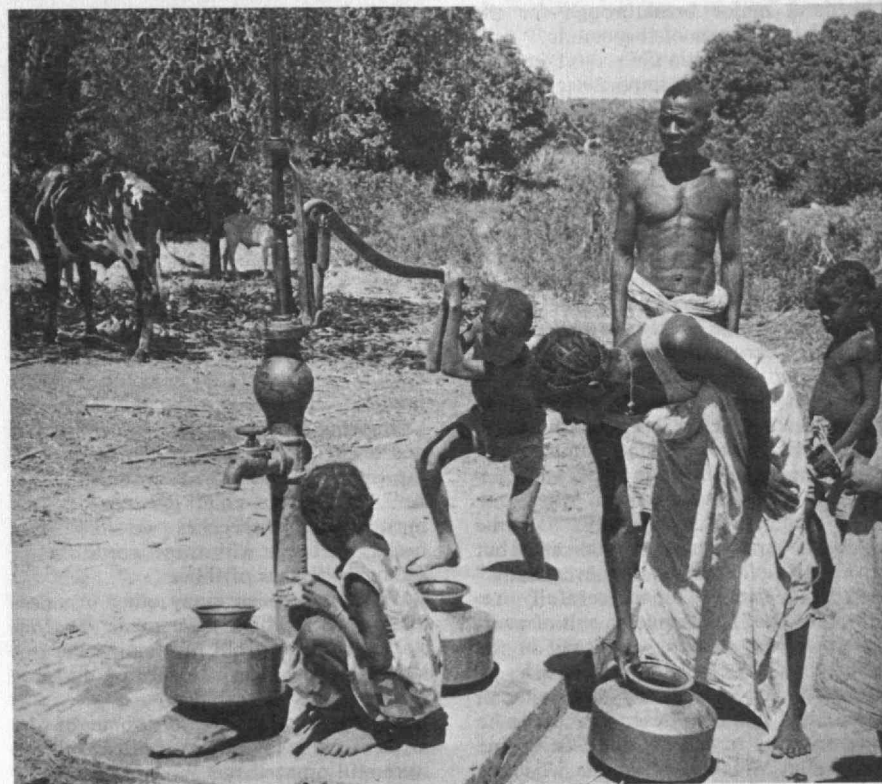
objects to climb upon or rub against, usually to the detriment of the pump.

Simple distribution systems are used which consist of bolted steel water tanks mounted on steel towers or—more commonly—masonry platforms of suitable height. In smaller communities a battery of four to six faucets is constructed near the tank, while in larger towns six to ten public fountains are placed in suitable locations throughout the settlement. Water is not metered, and so a head tax or a hut tax is levied to pay for fuel and maintenance of the pumping systems. The rural areas of Madagascar operate on a barter economy and very little money changes hands. In these places realistic budgeting for maintaining water systems is practically impossible and it is necessary for the Province to provide assistance. Although the pumps and accessories are donated by the project, the communities benefited are expected to provide labor and construction material such as cement and gravel. Generally it is the prisoners who show up at our work sites, but we have found them willing workers.

Three of the outstanding Malagasy technicians were sent to the United States for further training. An engineer was given a year's course at the University of North Carolina and the other two men were sent for a four-month course in groundwater development at the University of Minnesota. The engineer is presently chief of the hydrogeological section in the government water department. We hope that funds will be available next year to send more potential leaders for advanced training in the U.S.A.

Organizational Developments

One of the past weaknesses of this country's approach to the water problem has been the many separate government organizations which have been involved in the water field. Their overlapping responsibilities have caused needless confusion and inefficiency. This year the government created a national water and energy service and has consolidated the various groups into one water division. This move should improve the situation



When well-drillers come, the village celebration includes the slaughter of a cow—a sacrifice designed to insure the well's success. Later, the village well—a hand pump or a powered pump with reservoir—becomes a community center.

considerably.

In this French-oriented country it has been difficult to get recognition and permanent status for members of the drilling crews. Since most of the men willing to work in the field have had limited education and are required to work with their hands, diploma-conscious officials have been reluctant to give them civil service positions. Only after providing them with work achievement certificates and applying constant pressure on the authorities were we able to effect a change in their status. Now the government has officially recognized their worth by creating a drilling section in the water division and by giving the best men civil service positions without requiring an examination. This is a major breakthrough for the skilled labor classes of this country.

At an early point in the project, emphasis was placed on the importance and the cost of maintaining water systems once they had been installed. Two well-servicing units consisting of hydraulically operated masts mounted on power wagons were purchased and crews trained to operate them and repair pumps. Village pump operators were also given instruction in the importance of changing oil periodically and keeping the fuel clean. Old habits change slowly, however, and I can remember one incident which illustrates why mechanical equipment is short-lived in this country. While visiting a certain town, I noticed that the usual pump man was not on duty, and when I asked the old gentleman who was getting ready to start the system where the other man was, he replied, "Oh, he joined the army three months ago, but don't worry—he taught me everything." Whereupon the old man carefully removed his coat and donned a suit of overalls which was hanging on a nail in the pumphouse. Then with a flourish he dusted the top of the fuel tank with an old rag and filled the reservoir. While he was struggling to get the stubborn engine started, the Malagasy mechanic who was with me asked him if he ever bothered to check the oil level. Oh yes, he said, he looked at it every week. Then with a

great show of thoroughness he removed the fuel sediment bowl, stirred the fluid vigorously with his index finger and when he had all the dirt particles in suspension he deftly removed the gas tank lid and dumped the contents of the bowl into it. We spent considerable time with that old man explaining the rudiments of proper engine care. I doubt if it did much good, however, for after all we were younger than he. His one comment after this briefing by the mechanic was, "Rubbish!"

Water: Key to the Future

It has been interesting to watch the development of communities after a permanent potable source of water has been found. One of the classic examples is the town of Andranovory. This settlement is located on a limestone plateau approximately 40 miles north of Tulear. The project drilled a 450-foot well there three years ago. A simple water system consisting of a 4,000-gallon reservoir and six faucets was then installed. The previous water sources were a stream 10 miles away during the rainy season, and the city of Tulear during the dry season of the year. Since the time the new water source was made available the population has more than doubled. Three churches have been built and a government school erected. At the present time a small post and telegraph office is nearing completion and a new hotel is doing a thriving business. Vegetable patches and a citrus fruit garden can be seen in the area. During the dedication of this well, the village chief gave one of the most touching speeches we have ever heard. He began with these words, "After a thousand years of thirst . . ."

There have been many other instances in this work which have made the constant separation from my family, the isolation and the long stretches of dusty or muddy roads tolerable.

Water is very scarce in some of the areas in which we have drilled, but we were still amazed one morning when the village ladies tramped down to the well site while the drilling operation was in progress and gathered up the thick mud

which was being bailed out of the hole. This they let stand long enough for the mud to settle out, after which they scooped the water off the top and put it in their jugs. They were daily companions at that job until a successful well was developed.

At several of the villages a cow was slaughtered upon the arrival of the drilling machine and the local holy man liberally sprinkled blood over the rig and the ground near the well site to insure good luck. On one such occasion the village could only come up with a calf. When they later complained that the output of the well was too small, a crew member told them that they should have found a bigger cow. When the inhabitants of a village learn that they are going to receive a well, no obstacle can stand in the way. On one occasion a project truck broke down causing a delay in a move to the next village. The chief of the crew was surprised to see a caravan of 12 bullock carts approaching his camp. When he asked what they wanted, he was told that they had come to move the drilling equipment to their town so that work could begin at once.

The Malagasy crew is now able to do much of the field work and with the U.S. equipment they should be able to continue the project for as long a time as is needed.

The Malagasy government has been very cooperative at all levels and has always met its financial commitments. Since these include all local operating costs plus the salaries of the Malagasy technicians, the government has first-hand knowledge of the expenses involved in a drilling program. Cost records have been kept for each well constructed. To this date 110 successful wells have been drilled and equipped with some type of pumping equipment. Most of this work has been done in the arid southwestern section of the island. Well depths have averaged 120 feet. However, one of 725 feet was drilled in the limestone plateau north of Tulear. Outputs have varied widely from a rate of over 1,000 gallons per minute (a well for the city of Tulear) to 10 gallons per minute at some village locations.

To an engineer like myself who has been exposed to the computer approach of the western world, this searching for simple solutions to problems, utilizing simple tools, has been a disciplinary and challenging experience—the appreciation and gratitude expressed by these humble people, high payment indeed!

Dr. David L. Ketcham, '60, has two careers: he came to M.I.T. for master's and doctor's degrees in civil engineering, and while in Cambridge he worked on problems of reactor radioactive waste disposal. His complementary humanitarian career of solving community water supply problems began with an AID assignment to Addis Ababa shortly after graduation from Missouri School of Mines in 1955 and has continued with the work in Malagasy which is described in this article written especially for Technology Review.

AID's first drilling rig in Malagasy used the project's pick-up truck for power and village women to supply drilling water.



working. Wolf has a commitment in West Berlin for most of the season. By the way, at commencement this year, **Jack Saloma** was Marshal of the graduates. . . . **Matt Lorber** and **Ray Stata** are owners of a Cambridge electronics company, Analog Devices. Actually, this is their second company, the first was Solid State Instruments, sold to a larger company. Their new company is growing rapidly and now has 125 employees. **Carl Hanks** writes that he is with the Stanford Research Institute. Job? Would you believe analysis of counter insurgency problems with fieldwork in Saigon and Bangkok? Or how about project manager for tactical and strategic reconnaissance systems analysis? Carl is married to the former Rosemary Muscato and has three children: Susan, Daniel and Martha. . . . **Mal Blotner** has been appointed a research operations analysis section chief in the Research Department of Lever Brothers. **Irving Elman** has joined the research department of the Copper Range Company. Irving will monitor new products starting commercial production. **Bob Krooss** writes that he is president of Simautics, Inc. in West Caldwell, N.J. Whatever that is! Bob has two children, John and Margaret. **Ragmar Olsen** has recently joined Honeywell's Computer Control Division as an industrial controls systems design engineer. Ragmar was in Europe in 1957-58 and in Sweden from 1960 to 1966 where he was married to a Finnish girl in 1961. The American Physical Society reports that four scientists, including **Phil Platzman** of Bell Labs, have made a major contribution to the understanding of electron movement in metals. . . . On May 9th, a daughter was born to the **Warren Briggs**—already parents of two boys. Fortunately, Renata, who has been teaching modern languages at M.I.T., anticipated the stork's early arrival sufficiently to have prepared her students' final exam well ahead. Sorry, boys. Warren continues in his work with Harbridge House.—Co-secretaries: **Bruce B. Bredehoff**, 16 Millbrook Road, Westwood, Mass. 02090; **T. Guy Spencer, Jr.**, M.I.T., Room E19-439, Cambridge, Mass. 02139

'58

Next June will be our big Tenth Reunion! Plans are underway now for a full weekend of fun and relaxation—you will be hearing the details in September. Although Alumni Day is on June 10 next year, we may hold the reunion on a different weekend—such as the 14-16th—instead of the 7-9th. So keep those June weekends free until the date is firm and plan to arrive on Friday evening when the festivities begin. . . . As many of you know, **Ed Jones** has been back at M.I.T. this year as an assistant professor in physics following work at Princeton. While at Princeton, Ed met his wife, Marilyn, who was a teacher in the elementary schools. They are living in Cambridge. . . . **Larry Boedeker** has finished up his Ph.D. and accepted a position with Pratt and Whitney Division of United Aircraft. Larry and Pat will be moving

to East Hartford, Conn. area in August and looking forward to the change of scene. Last summer they visited Europe and managed to get to Florence just before the rain and floods arrived. . . . Received a letter from Evie and **Stewart Pinsof** from their new home in Highland Park, Ill. "Received my masters' degree in finance from the University of Chicago and am working for Sipi Metals Corp. as plant manager. We have three children, Bruce, 7½, Corky, 5 and Debra, 1. Spending the summer weekends racing our Flying Dutchman on Lake Michigan." . . . **Mark Tenney** completed his Sc.D. in 1965 and went to Notre Dame to participate in their environmental health engineering program. Mark and Delphine have bought a house there and have two children—Scott, 6 and Barbara, 1. Recently, Mark was promoted to associate professor of civil engineering and says "am fortunate to have a number of research grants related to advanced treatment methods of wastewater." . . . **Ronald Tweedie** is employed as a transportation analyst with the New York State Department of Public Works. He and Carolyn, their children, Janet, 3 and Matthew, 2, are living in Delmar, N.Y. . . . **Robert Lofgren** is the Chicago district manager for Rollway Bearing Company. Molly and Bob, with Erik, 7, and Kristen, 4, are out in Deerfield, Ill. . . . **Lou Giordano** is with BTU Engineering as production manager—"have my hands full there but try to keep up with squash, skiing and Toastmasters."

Tom McClimans was just recently married in February. He and Else sent a card from Norway where Tom is "vitenskapelig assistent, Institutt for Geofysikk, Universitetet i Oslo, Blindern." . . . Also married fairly recently in June '66 is **Richard Nyder**. He and Penelope are in Los Angeles where he is a project group engineer with the Whittaker Corp. As a hobby, he has been engaged in the "study and exploration of California history, mainly ghost towns, with emphasis on lost mines, treasure hoards, etc. (so far unsuccessful in the latter regard)." . . . **Matthew Smith** is currently a research associate at Pratt & Whitney advanced materials R&D laboratory in North Haven, Conn. He writes that "the lab is in the process of moving to bigger and better quarters at Middletown, Conn.—madhouse! Elma and I have been renovating a 100 year old farmhouse for 20th century living—I plumb, wire and carpet while she plasters, paints and has babies (Doug, 9½, Sonia, 8, Elizabeth, 6, and Rebecca, 4 months). Maybe we'll finish all these activities by the 21st century—in time to get back to the more serious business of skiing, camping and racing sports cars." A note from **Yanni (John) Posnakoff** tells us that he became a U.S. citizen and changed his name John to Yanni. He also wrote that "am not practicing profession of naval architect but am painting and making movies. Just illustrated a new book *Children's Letters to God*." . . . **David duFour** just completed his second year at Harvard Business School. He and his wife, Katherine, have one son, Mark, 3. . . . Well, that is all the news for this last issue of the year. To those

of you who participated in the 'ostrich hunt', my thanks. To those of you who don't know what that means, we sent out cards asking for news from a group of classmates we have not heard from since graduation. We've received such a good response that I have to hold over some of the news until next fall, first issue, I promise. Have a good summer and vacation.—**Michael E. Brose**, Secretary, 1171 North Street, Walpole, Mass.; **Antonia D. Schuman**, Western Associate, 22400 Napa Street, Canoga Park, Calif.

'60

Lots of mail this time. From **Jerry Levine**: "Effective January, 1967 I was appointed project manager for Dai-Ichi General, Ltd., a General Mills subsidiary in Japan. My responsibilities include all phases of design, construction, and start-up of a new specialty chemicals plant near Osaka. I have contracted with a Japanese engineering firm for the design and construction according to Japanese standards. So far this year I have been in the Far East two times, for 3 weeks and 6 weeks. I expect to return once or twice during the summer. In the fall I plan to take my wife Sharon and 2-year-old daughter Robin back with me for 3-6 months. On my last trip to the Orient I visited with **John Sampson** and **John Schaefer** in San Francisco. Sampson is with AT&T Longlines Division and Schaefer is a student at San Jose College and a part-time employee of Philco. Regards to all 1960 classmates." . . . And **Al Krigman** sent along all sorts of news—from Columbus, Ohio (that's what the return address said). Unhappily, he did not mention what he is doing in Columbus so that piece of information cannot be passed along. At any rate, **Steve Shimbberg** wrote the following to Al: "**G. H. Cronin** was here this Sunday on the way to the IEEE show in N.Y. We're going to visit him in May or June to go sailing on Chesapeake Bay in his 17' O'Day day sailer. We see Barbara and **Mike Gross** frequently—he's with Bunker-Ramo in Stamford." (Connecticut, no doubt, since Steve is living in Yorktown Heights.)

Once again from Al Krigman: Al passes on the following from **Pat Spangler**: "I joined the faculty of the Nuclear Engineering Department of the Kansas State University in Manhattan, Kans. While being an assistant professor is both challenging and interesting, I soon found that Kansas and I do not appreciate the same things. Having resolved to depart the Sunflower State, I sent a resumé to Aronutronic. A few weeks later, I was flying to California for an interview. At the time I was sure that they had misread my resumé, but I received an offer and decided to try it. After I received my security clearance, I found out that I was working in defense. As a letter from the Defense Atomic Support Agency states: 'In spite of what has appeared recently in the open literature, these subjects are Secret.'" Now from **Don Silverman** via Al: "So here I sit somewhere in a combat zone sipping rum collins in my bungalow,

scheming always to find ways to go to Vietnam and thereby claim combat pay and \$500 tax exemptions. Having seen **Ron Agronin** as I travel criss-cross from Air Force base to base enjoying his increasing domesticity as child follows child . . . then there is **George Walsh**, married too. A papa and from what I hear, maudlin about the whole business as if he were the first." Al adds this comment: "If you know Don Silverman at all well, you will realize that even in the small portion of his letter that I excerpted, there have been a few deletions and skipings over. This is to protect you and me, the Review, the United States of America, and, of course, Captain Silverman, USAF." Thank you very much for all the news, Al. . . . **Al Shalleck** was here this month (in Cambridge, that is). He's just married and is now working in New York for the Diebold group. Al reported news of **Mark Dichter**: Mark is sound man for Joe Foss, and is busy travelling all over the world working on the filming of safaris, big game hunts, and the like. . . . **Mike Padlipsky** leaves this week—if the weather holds out which is very unlikely as I write this—for a three week vacation in London. . . . Last but not least, news of the **Spragues**: **Chris** has been appointed assistant professor of management at the Sloan School; his Ph.D. thesis is now in the painful process of being moved from billions of tapes, cards, millions of miles of output, etc. into some sort of presentable form. An amazing procedure, really. I've been admitted to the DBA program at the Harvard Business School and will start paying tuition very shortly after picking up an MBA from Boston University—which in turn will happen only if I stop writing class notes and get back to a substantial written document which is due at B.U. this very week.

I wish someone in the class of 1960 would have his picture taken and sent in so we could have a beaming but familiar face on this page. Send it—with elaborate details of your life and times to—**Linda G. Sprague**, 345 Brookline Street, Cambridge, Mass. 02139

'61

My, you people are shy. I'm sure that you are all advancing the frontiers of science and engineering, but you keep it to yourselves. I am reduced to culling the clippings. The *IEEE Transactions* says that **Steve Weiner** got his Ph.D. from M.I.T. in '65 and now is employed by Lincoln Labs. His specialty is electromagnetic scattering, although his previous experience was in acoustics and plasma physics. . . . *Electronics* tells all on **Rodger Cliff**. Since graduation he has been at Goddard Space Flight Center where "he has investigated data processing and compression methods for small scientific spacecraft." . . . And finally *Metal Progress* says that **Larry Schmer** is a "Man of Metals" (SHAZAM) and that he is a metallurgist at Procter and Gamble. . . . **Paul Hogle** got his master's in business administration last February at Western Reserve. Over at the Harvard



Rodney E. Hanneman, '61 (left), is one of three scientists at the General Electric Research and Development Center who have together discovered in meteorites a form of diamond (so-called "hexagonal") never before known in nature. Hexagonal diamonds have previously been synthesized at GE by subjecting graphite to extreme pressures and temperatures in huge presses such as the one shown above. Dr. Hanneman's colleagues are (left to right) Francis P. Bundy and Herbert M. Strong.

Medical School Dr. **Martin Falxa** was appointed a research fellow in pathology. His Ph.D. is from the Polytechnic Institute in Brooklyn this year. . . . **Peter Fishman** is a grad student at George Washington University, School of Medicine. He has published, as we all should. His was in *Science*. He also presented a paper at last year's Federation (FASEB) meeting. . . . **Dave Sachs** has left his co-ed dormitory at Tufts. He writes: "I received my Ph.D. in physics from Tufts in November, 1966. I'm now working at Avco Missile Systems Division, Wilmington, Mass., in the nuclear effects division. Am delighted to be through with school." . . . Well, that's it for the year. Let us know how the summer went, about your shiny new diploma, or the new kids in the family. If you go through Boston give me a call at RE 4-9392. Have a good swinging summer.—**Andrew Braun**, Secretary, 131 Freeman Street, Brookline, Mass. 02146

'62

The reunion will be over by the time this article goes to print, and I'm sure it will have been a tremendous success thanks to the efforts of the reunion committee. A full accounting of the proceedings will certainly appear in a fall issue of the Review. I hope that participation in the reunion will have been substantial and that more and more people will take an interest in our class reunions, news, and support for M.I.T. . . . **David Wormley** lectured at a seminar entitled "Putting Fluids to Work" at the Franklin Institute in Philadelphia. The seminar involved vortex fluidic devices including diodes, vortex amplifiers, gyro, and digital analysis and was sponsored by the National Fluid

Power Association. . . . Dr. **Victor B. Schneider** was named an author for the 1967 Spring Joint Computer Conference held in Atlantic City, N.J., on April 18-20. The conference is one of two sponsored annually by the American Federation of Information Processing Societies to encourage exchange of information on advanced developments in computer-related fields.

Dr. Schneider is one of six authors selected by the Spring Joint Computer Conference committee to deliver a paper on programming language processing devices. The title of his paper is "Syntax-Checking and Parsing of Context-Free Languages by Pushdown-Store Automata."

It introduces a technique for automatically checking the grammar of sentences in context-free languages. Dr. Schneider is assistant professor of Computer Science, University of Maryland, College Park, Md. He holds an M.S. from Stanford and a Ph.D. in Computer Science from Northwestern.

No further news to report except that it has been a pleasure to learn of and write about the achievements, interests, and whereabouts of all of you for the past five years.—**Jerry Katell**, Secretary, 310 Hoge Building, Seattle, Wash. 98104

'64

The only one entitled to the rank of Class Hero this month is **Peter Ordeshook**, who sent news of himself and two others. Really fellas, I'm not asking for an exponential, geometrical, or even an arithmetical increase in the number of letters I get each month—but please don't make it a disappearing fraction! If all goes as planned, the N—X of you (where N is the number in our class and X is the small subset of N who wrote me this year) will

David M. Wolfson,
'64



have a chance to atone for your sins by filling out a class questionnaire that will go out in late September. The next issue of Technology Review will not be until November, and hopefully your completed questionnaires will fill the column in the issues thereafter. . . . Now for the news this month: **Karl Frederick** has been commissioned a second lieutenant in the Air Force after completing OTS training. He has been assigned to Keesler AFB in Miss. as a space systems operations officer. . . . **Dick McEntire** was married in December to Miss Robin Ladd of Wellesley College. They are living in Minneapolis where Dick is working on his Ph.D. in physics at the U. of Minn. . . . **Henry Noble** is now working for the System Sciences Corporation in Falls Church, Va. . . . Peter Ordeshook has passed his Ph.D. qualifying exams in political science and is working on his thesis. He will have an article appearing in the June, 1968, issue of the *American Political Science Review* entitled "A Theory of the Calculus of Voting." (It took two exchanges of letters to establish that he really meant 1968. That's political magazines for ya!). . . . **Bob Scott** is continuing to work as the administrative assistant to Dean Brown of the M.I.T. School of Engineering. . . . **David Wolfson** has been commissioned a second lieutenant in the Air Force after completing OTS. He has been assigned to Lyndall AFB in Fla. for training as a weapons controller. That's all for this volume. I hope everyone is enjoying the summer.—**Ron Gilman**, Secretary, 2227 Vollintine Ave., Memphis, Tenn. 38108

Graduate Students

The following items are included to honor two graduate alumni with determination to succeed. The president of Lebanon Valley College, Annville, Pennsylvania, has announced the promotion of **Dr. Robert E. Griswold** to the rank of associate professor of chemistry, effective in September 1967. Bob Griswold holds a B.S. degree from New Bedford Institute of Technology, an M.S. in chemistry from Northeastern University, and a Ph.D. degree in analytical chemistry from M.I.T. (1960). He has been a member of the faculty at Lebanon since 1960. Bob was an instructor at Northeastern for one year, an instructor at Lincoln Institute (night school) for one year, taught as an assistant three academic years at M.I.T., was awarded a National Science Foundation Fellowship for twelve months (1958-

1959) and assisted his research supervisor (Buck Rogers) half time until he graduated. He was highly respected by his students and never failed to volunteer his services for extra assignments.

Many of the alumni of the 1942-1945 era will remember **Mahlon Etheredge** who was awarded a Ph.D. degree in chemistry in 1945. Dr. Etheredge was awarded the B.S. degree (Clemson College-1918) and the M.S. degree in chemistry (Mississippi College-1940). He taught at Mississippi State prior to the award of the doctorate; entered M.I.T. in November, 1943 on leave of absence, and returned to teach and to become head of the Department of Chemistry and dean of the School of Science. Dr. Etheredge retired on June 30.

On May 13 he represented M.I.T. at the inauguration of Dr. William Lincoln Giles as the thirteenth president of Mississippi State College at the request of President Howard Johnson.—**Leicester F. Hamilton**, Room 4-258, M.I.T., Cambridge, Mass. 02139

VI

David R. Whitehouse, S.M. '54, Sc.D. '58, has been named technical manager of Raytheon Company's Laser Advanced Development Center, Waltham, Mass. Dr. Whitehouse was a principal research scientist on the staff of Raytheon's research division where his work since late 1965 has been concentrated primarily on gas lasers, and has brought about some notable gains in output power and operating efficiency of molecular gas lasers. He resigned his associate professorship in electrical engineering at M.I.T. in 1965 where his major activity was in the field of plasma dynamics. Dr. Whitehouse received the BS degree in electrical engineering at Northwestern University in 1952. . . . **Richard H. Fuller**, S.M. '54, is the manager of the Information Technology Department for the Advanced Technology Center, Librascope Group, General Precision, Inc., Glendale, Calif. He was one of four speakers selected by the Joint Computer Conference committee to deliver a presentation on large computing capabilities achieved through parallel processing. A graduate of California Institute of Technology in 1952, Dr. Fuller was awarded the Ph.D. degree at the University of California, Los Angeles, in 1963. . . . **Jack Capon**, S.M. '55, is a staff member in the seismic discrimination group at the M.I.T. Lincoln Laboratory. He did his undergraduate work at the College of the City of New York and followed his graduate work at M.I.T. with an instructorship at Columbia University, receiving the Ph.D. degree at that university in 1959. . . . **James G. Gottling**, S.M. '56, Sc.D. '60, received on April 6 one of five awards in recognition of outstanding teaching ability at Ohio State University where he is associate professor of electrical engineering. "The teachers honored," President Fawcett said, "have demonstrated to their peers and to their students that the processes of discovery and creation can be applied with equal validity to both teaching and re-

search." Recipients of the distinguished teaching awards were selected from nominations submitted by students, faculty, and alumni. The awards included a cash gift of \$1000 each. Professor Gottling received the B.S. degree in 1954 from Lehigh University and held an assistant professorship at M.I.T. when he accepted his present position in 1965. His specialty is solid-state and thin-film device electronics. . . . **Donald R. Schertz**, S.M. '61, E.E. '63, has been awarded a National Science Foundation fellowship to enter upon doctoral study at the University of Illinois this June. He is currently assistant professor of electrical engineering at his alma mater, Bradley University, from which he has been granted a leave of absence. . . . **Marco A. Murray Lasso**, S.M. '62, Sc. D. '65, was a recent visitor at M.I.T. He has been with Bell Telephone Laboratories in Whippany, N.J. since June 1965. He did control systems design for the SPRINT missile of the NIKE-X project and is now working with integrated and thin-film circuitry, directing a group engaged in computer-aided design. Marco recently initiated an exchange arrangement of digital computer programs for circuit design between some American and Mexican agencies. He is organizing a computer aided design symposium at the University of Mexico for this June. He has taught two courses in engineering applications of matrices at Bell Laboratories. He did his undergraduate work at the University of Mexico where he also taught electrical engineering and physics. He was awarded the Pan American and Grass Instrument Company fellowships to study at M.I.T. . . . **Robert S. Kennedy**, S.M. '59, Sc.D. '63, and **Donald E. Troxel**, S.M. '60, Ph.D. '62, assistant professors in electrical engineering at M.I.T., were visitors this spring to the United States Army Electronics Command, and with representatives from 13 other major universities in the eastern part of the country participated in Fort Monmouth's first "invitational research tour of the U. S. Army electronics community." Major General W. B. Latta in his invitation to the universities said, "It is possible that concepts, devices, and theories being worked on by our laboratory personnel may be of interest to you, and there undoubtedly must be new ideas and concepts originating in the academic field that may be of extreme value to an organization such as ours." Visits were made to SATCOM and the Deal Research Center. Professor Kennedy's undergraduate work in electrical engineering was done at the University of Kansas and Professor Troxel's at Rutgers University. Kennedy has the distinction of being the first M.I.T. recipient of the Ford Foundation fellowships for doctoral students in engineering. Both Kennedy and Troxel served as officers in the armed services, and both are promoted to associate professorships at M.I.T. beginning July 1, 1967. . . . **John B. Plant**, Ph.D. '65, assistant professor during the past academic year, now becomes professor and chairman of the Department of Electrical Engineering at the Royal Military College of Canada, Kingston, Ontario. His undergraduate education was done in part at

his present institution and subsequently at the Royal Naval Engineering College in Plymouth, England. He served as an engineering officer on destroyers with the Royal Canadian Navy, attaining the rank of Lieutenant Commander. The substance of his doctoral thesis, under the supervision of Professor Michael Athans, was reported at a meeting of the International Federation of Automatic Control in London in June, 1966 and in the October, 1966 *IEEE Transactions on Automatic Control* under the title, "An Iterative Procedure for the Computation of Fixed-Time Fuel-Optimal Controls."—**Karl L. Wildes**, Room 4-343, M.I.T., Cambridge, Mass. 02139

XIII-A

April and May were busy months in the Department of Naval Architecture and Marine Engineering. **Frank J. Graziano**, '45, paid us a flying visit late one afternoon. Frank is currently vice-president and general manager of manufacturing in the American Can Company. After leaving M.I.T. in 1945, Frank served in the New York Naval Shipyard and the Bureau of Ships before leaving the Navy. Frank and Jo-Ann live in Short Hills, N.J., with their four children. The oldest child is attending Penn State and number two is scheduled to enter Villanova next fall. . . . On April 28, the NROTC and Naval Administrative Unit, M.I.T., held its first Dining-In. This affair was widely attended by members and friends of the Navy at M.I.T. Among those present were the following distinguished alumni. **Thomas V. Hennessy**, '46, the proud father of Midshipman Hennessy in M.I.T.'s NROTC Unit. Tom has recently been promoted to the position of director of manufacturing service of the Foxboro Company, Foxboro, Mass. He and his family live in Dedham, Mass. Captain **Stuart Jones**, '46, USN. Stu is the commander, Boston Naval Shipyard. He and Doris continue to spread their charm on the Boston waterfront and are faithful attendees at all the Navy functions held at M.I.T. Captain **John Duke**, USN, '46, is currently supervisor of shipbuilding, General Dynamics Corp., Quincy Division, Quincy. With the increase in activity at the Quincy yard, this position was recently re-established. John came to Quincy after a tour as production officer at Long Beach Naval Shipyard. . . . Lieutenant **Millard Firebaugh**, USN, '66, visited Tech in April while on leave from Portsmouth Naval Shipyard. Millard is currently busy working on the overhaul of Polaris submarines. He advises that he still completes a few sets of tennis from time to time. He visited Boston early in April to witness the opening of the New York Metropolitan Opera. Later in the month he attended the Dining-In. . . . On May 10, Captain **William Nicholson**, USN, '48, visited the Department of Naval Architecture and Marine Engineering to deliver a seminar on the Deep Submergence Program. Nick is the technical director of the Deep Submergence Systems Project in the Navy Department.

Nick gave a very interesting description of the many projects underway for the Navy in the area of deep submergence. His talk was well attended by a most enthusiastic audience. Before being assigned to the Deep Submergence Project, Nick was director of the Ship Design Division, Bureau of Ships. Nick and his family are now living in Bethesda, Maryland. . . . **Victor Atkins**, '46, was in town recently visiting his son at Harvard and checking on propeller business in the area. Vic is the manager of the Doran Company of California and is currently living in San Francisco.—**Capt. Robert E. Stark**, M.I.T. 5-304, Cambridge, Mass. 02139

Club News

Architecture Alumni Association: First Meeting Held

Eighty-five Alumni of the Department of Architecture met for lunch on Tuesday, May 16, at the City Squire Hotel in New York City. Architecture graduates have been meeting for many years at the annual conventions of the American Institute of Architects (which this year was held at the nearby New York Hilton); but this meeting was different. The attendance was larger than it had been in anyone's memory. And the luncheon marked the founding of a new division of the Alumni Association, the Architecture Alumni Association. This makes architecture the third department to form such a group.

Master of ceremonies for the meeting was Samuel E. Homsey, '26, of Wilmington, who identified members of classes ranging from 1907 (Earl H. Reed) to 1966 (Byron C. Gilchrest) in the group. Glenn Stanton, '21, past president of the AIA was also present. Sam Homsey outlined the objectives of the new organization. The response to the idea was enthusiastic. A typical comment from the floor was, "Why hasn't this been done before?" (John Dixon, '55, New York). At the head table sat Dean Emeritus Pietro Belluschi, plus several M.I.T. alumni who were being elevated to fellowship in the AIA; among these were Mrs. Samuel E. Homsey, Alfred S. Alschuler, '35, and George F. Schatz, '30. Dean Lawrence B. Anderson, '30, introduced Donlyn Lyndon who will be the new chairman of the Department of Architecture. All 2,400 graduates who were at some time registered in the department will be receiving further information about the new group and its plans during the next few months.—**Bernard P. Spring**, '51.

Alumni Council: Computers at M.I.T.

The present state of computers at M.I.T. and steps that the Institute must take to remain at the summit of this field formed the main subject matter of the Alumni Council's meeting on May 22. Professor William B. Kehl, '54, Associate Director of the M.I.T. Computation Center, described the present state of the art and pointed out some of the prospects for future involvement of computers in college

education.

Professor Kehl started his talk with a brief survey of the national college scene. After only 10 years in which colleges have shown interest in computers, Professor Kehl noted, over 700 schools possess between them more than 1,200 computers. In 1965, colleges spent \$2.5 billion on new computers, and this expenditure is growing at a rate of 25 per cent per year. Students are using computer time to the tune of \$60 each per year. And the use of computers is now logical in 35 per cent of college courses.

Turning specifically to M.I.T., Professor Kehl voiced the opinion that the Computation Center is rapidly coming to resemble the Athletics Department, in that it must serve the entire community. In fact the M.I.T. time-sharing system at present has about 200 terminals around the campus. Each user switching into the system has access to a very large file of data from other users who have made their results and programs generally available. Indeed, no other time-sharing system can yet interchange data in this way. In the future, Professor Kehl hopes to see a number of satellite computers around the campus.

In trying to understand the role of computers on the campus, one must understand that they can achieve far more than simple problem-solving of the adding machine variety. Among more exciting ways of using computers at M.I.T., Professor Kehl mentioned the work in protein structure by Professor Cyrus Levinthal, and studies in sociology by Professor Ithiel D. Pool.

To the student, Professor Kehl concluded, the computer opens up an immense new field of research. It increases the student's engagement in research, for students brought up with a computer at their elbow can often see the possibilities of computers when faculty members are struggling with conventional research techniques.

Another highlight of the evening was the "surprise" appearance of President Howard Johnson, to answer questions on the proposed link between M.I.T. and Wellesley (see *Technology Review*, June, 1967, page 68).

President Johnson stressed that the experiment is a modest one, which gained great publicity because Wellesley is a girls' school; M.I.T. already has similar arrangements with a number of institutions in the Boston area. The purpose of the experiment, President Johnson continued, is to give undergraduates some additional options during their four years; students will probably take only minor counsel at the other college.

Answering questions, he said that M.I.T. students would probably be attracted to Wellesley courses in the humanities and social studies—indeed to all their courses except science. However, there was no intention of reducing M.I.T.'s commitment to the humanities as a result of the arrangement. Nor would M.I.T. feel less inclined to enroll coeds; what the girls have shown us during the last few years, he said, is a useful addition to the whole educational mixture.

Finally, pressed by a questioner to

trace the beginnings of the link-up, President Johnson answered that the course of the courtship must remain a secret, but that the man usually makes the first move.

M.I.T. Club of Washington: Hynek on UFO's

Over 650 Alumni and guests gathered at the Department of the Interior on May 11 to hear Professor J. Allen Hynek, Chairman of the Department of Astronomy at Northwestern University, speak on unidentified flying objects. UFO's have been an interest of Professor Hynek's since 1948 when he became scientific consultant on the subject to the Air Force. His talk (see report in *Trend of Affairs*, page 35) ranged from serious science to comic relief. In addition to some (possibly doubtful) photographs and sketches of UFO's, Professor Hynek showed his audience UFO cartoons; a number of these referred to marsh gas, his celebrated explanation for one particular UFO sighting in Michigan. Down from Cambridge for the evening, in addition to *Technology Review's* reporter, were Professor Hynek's son Scott H. Hynek, '65, a research assistant in M.I.T.'s Department of Mechanical Engineering, with his wife Susan. Gilbert H. Lewis, '51, President of the Club, chaired the meeting.—Merlyn J. Block, '41, 6412 Ruffin Road, Chevy Chase, Md.

M.I.T. Club of Boston: James Goodsell Speaks

On May 12th the M.I.T. Club of Boston was addressed by Dr. James N. Goodsell, Latin American Correspondent for the *Christian Science Monitor*. The speaker had recently returned from Uruguay where he had covered the Punta del Este Conference.

Dr. Goodsell stated some sobering statistics on the economic and social plight of the Latin American countries. Among the figures he cited were the following: unemployment rates of 30 per cent; 90 per cent increase in inflation in Brazil during the past year; concentration of 50 per cent of the Latin population in 40 major cities where sizable numbers of people live in unbelievable poverty; 50 per cent of the population falls in the age group below 20 years—for these young people there is little hope for betterment.

Although reforms have been slow because of power concentration in the hands of ruling oligarchies, strides have been made in some countries; notably Chile, where the non-Communist left has come to power by constitutional means.—Eugene M. Darling, Jr., '53, Boyce Farm Road, Lincoln, Mass. 01773

M.I.T. Club of Fall River: Historic Boston and Cambridge

The M.I.T. Club of Fall River held a spring dinner meeting on Wednesday, May 10, 1967 at the Quequechan Club in Fall River, Mass. Thirty people attended, including alumni, wives and guests. President Benjamin Hampshire conducted the meeting, which was arranged by two '32ers, Professor Albert Stewart, Southeastern Massachusetts Technological Institute, and Lester Glickman, Naval Underwater Weapons Research and Engi-

neering Station, Newport, R.I. Douglas P. Adams, Associate Professor of Mechanical Engineering at M.I.T., was the speaker of the evening, and he delivered a fascinating, illustrated talk on historic Boston and Cambridge, based on an elective course at M.I.T. which provides the students with tours and informal lectures on the cultural and historic background of those two cities. A short business meeting was held, at which the following were elected officers of the Club for the ensuing year: President: Albert Stewart, '32; Vice President: Lester Glickman, '32; Secretary-Treasurer: Morris Lepes, '36.—Lester Glickman, '32, 1 Jude Street, Middletown, R.I.

M.I.T. Club of Delaware Valley: Annual Spring Dinner Meeting

The M.I.T. Club of Delaware Valley was addressed by Professor Lucian Pye of M.I.T. at the annual Spring Dinner Meeting. The topic of the evening was "Politics in the Power Struggle in China." The presentation covered a description of the political science efforts at M.I.T. and a tracing of the current activity of the Red Guard through events leading to its formation from approximately 1958. The discussion of the rise, tabling, and resurrection of Mao proved to be both extremely interesting and helpful in achieving a little better understanding of the China enigma. Dr. Pye proved to be versatile in a broad spectrum of subjects as the question and answer session progressed. The meeting, dinner, and cocktail hour was held at the Hotel duPont in Wilmington, Dela. during the evening of May 13, 1967.—Edward S. Halfmann, '36, 432 Parkview Drive, Wynnewood, Pa. 19096

M.I.T. Club of Central New York: Beware of "Spectaculars"

James R. Killian, '26, Chairman of the M.I.T. Corporation, urged in Syracuse this spring that educators subject all new educational technology to the basic test of whether it genuinely serves the fundamental purposes of education.

"We should not let the technological tail wag the educational dog," Dr. Killian said. "We live in a time when we are inclined to be bemused by technological spectaculars; we should appraise this technology by the way it serves the individual and the best purposes of our society."

Dr. Killian was the principal speaker at a dinner meeting co-sponsored by the Technology Club of Syracuse, the M.I.T. Club of Central New York, the central New York section of the Science Teachers Association of New York State, and the Syracuse sections of the Institute of Electronics Engineers and the American Society of Chemical Engineers. The audience included 65 Alumni and wives.

Technological advancement has made similar advancement in the humanities and social science all the more vital. The flourishing of "megatechnology" that begets megalopolis and its associated problems, he said, requires of man a "corresponding enlargement of his social and political grasp and the invention of new management skills and concepts to cope with social complexities.

"To shape and use this new technology

to serve man and not to dominate him, we will need more great humanists and great artists and great social scientists, many of whom will embrace more than discipline."

Scientists and engineers, Dr. Killian said, can neither be blamed nor exonerated for the misuse of technology.

"Whatever his vocation, man is to blame—his insensitivity to fight in the public arena for what Edward Higbee has called our 'public standard of living.' Whether he be humanist or technologist, man must do more than proclaim his commitment to these higher humane standards; he must also commit himself to the grubby political battling required to make social action stick."

Dr. Killian reviewed several examples of technological advances that are bringing about the opportunity for revolution in education. Not the least of these, he said, is television.

"When skillfully conceived communications systems, such as TV or communications satellites, are bearers of trivia, we alibi by blaming it all on technology," he said. "The social scientist, the minister, the professor, the engineer, and you and I all have a responsibility to work for higher standards of taste."

Dr. Killian said universities must lead in initiating experiments to find "the pedagogical and humanistic innovation which will enable us to make the best use of technological innovations." The task is very large, however, and requires the overall multidisciplinary approach of systems analysis and engineering which has been applied so effectively in space and defense by the national laboratories and nonprofit research corporations. Community health and urban affairs are examples of opportunities for a systems approach.

"New kinds of institutions may be necessary to permit the appropriate participation of university scholars in such systems efforts without encumbering the university with tasks inappropriate for an educational institution," he said.

New institutional arrangements could draw upon universities in applying modern technology to educational reform and, at the same time, protect the university's traditional role as a community of free and objective scholars, Dr. Killian said.

"It is of the greatest importance that the universities protect this freedom and objectivity and that they not compromise it by entering into any kind of relationship, whether it be with industry, government, or other institution, that makes it difficult for their faculties to be independent in judgment and unfettered in scholarship.

"This will not be easy, but we shall never forget that a great body of scholars—uncommitted, independent, and scrupulously objective—is the best insurance that scholarship will have unimpeachable integrity and that there will be no abuses of the profound public responsibilities scholars are increasingly called upon to assume."

Dinner chairman was Bernard Chertow, '48, an officer of Bristol Laboratories of Syracuse, N.Y., Technology Club vice-president, and a former member of the M.I.T. Chemical Engineering Faculty.



Dayton H. Clewell, '33 (left), and Julius A. Stratton, '23, shared the speakers' rostrum at the Fellows Dinner of the M.I.T. Alumni Center of New York on June 1, where Dr. Stratton received the Center's Silver Stein Award.

Among honored guests at the dinner were representatives of Syracuse area city and county governments and schools, colleges and universities. The M.I.T. Club participation was arranged by Donald L. Duecker, '50, President; Henry W. Bowman, '63, Vice-president; and Joseph H. Copp, '39, Secretary.

M.I.T. Club of Western Maine: Early Boston: History and Folklore

On May 26 the Western Maine Alumni Club held its spring dinner meeting at Portland. Our guest speaker, Professor Douglas P. Adams of M.I.T., gave an entertaining talk on early Boston, illustrated with lantern slides. At the Institute, Professor Adams gives a freshman seminar on "The Birth and Care of a City," depicting the history of metropolitan Boston—its cultural heritage, its contribution to national welfare and its role in technology, business and the arts. In his talk to our group he included highlights from his seminar—illustrating them with many humorous incidents and anecdotes.

Alumni members and wives attending were: John Babcock, '10, Secretary; Hall Baker, '22, and Mrs. Baker; Charles Bartlett, '27, and Mrs. Bartlett; David Campbell, '25, and Mrs. Campbell; Bob Follansbee, '32, and Mrs. Follansbee; George Gilfoil, Jr., '62, and Mrs. Gilfoil; Don Hooper, '15; Bob Lindquist, '51, President, and Mrs. Lindquist; Phil Lord, Jr., '43, and Mrs. Lord; Fred Lufkin, '10; Lloyd MacAdam, '27; John Magarian, '52, and Mrs. Magarian; Ed Norris, '31, and Mrs. Norris; Bill Richardson, '44, and Mrs. Richardson; Ed Rossman, '18, and Mrs. Rossman; Earle Sanborn, '23; Tom Shepherd, '22, and Mrs. Shepherd; Curtis Snow, '51; Edgar Ward, '25; Leyland Whipple, '04; Phil Wilder, '23, and Mrs. Wilder; Professor Adams and several other guests.—John B. Babcock, '10, Club Secretary, 33 Richardson Street, Portland, Maine 04103.

Alumni Center of New York: Fellows and the Silver Stein

Just under 250 Alumni and their wives at-



tended the Fellows Dinner of the M.I.T. Alumni Center of New York at the Plaza Hotel on June 1 to pay tribute to Julius A. Stratton, '23, President-Emeritus of M.I.T., who received the New York group's coveted Silver Stein Award.

Thomas D'A. Brophy, '16, himself a former Silver Stein winner, presented the award, pointing out that Dr. Stratton was "one man in Cambridge who has always stood for proper representation" of the Institute in New York through its 7,000 Alumni in the metropolitan area.

Dr. Stratton responded by assuring his audience that "whatever contributions I have been able to make have been rewarded 1,000 times."

Earlier on the evening's program, Howard W. Johnson, Dr. Stratton's successor as President of M.I.T., paid his own tribute to his predecessor: "When we describe his dedicated service to the Institute, we describe the entire profile of M.I.T. He brought to the Institute a central concern for quality," said President Johnson.

Both President Johnson and James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation, had praise for the programs of the M.I.T. Alumni Center of New York. Dr. Killian called it "one of the most significant things that has happened in the Institute's Alumni community" in the period of his connection with the M.I.T. administration. And President Johnson noted his special interest in the continuing education activities of the Center—an area of endeavor, he said, in which the Institute feels a growing responsibility in behalf of all Alumni.

Dayton H. Clewell, '33, General Chairman of the M.I.T. Alumni Center of New York, was toastmaster for the evening. He in turn introduced as his successor for next year, Harold W. Fisher, '27, who announced that the opening event on the Center's 1967-1968 calendar will be a reception and concert by the Festival Orchestra of New York in Philharmonic Hall on October 11.

Former Silver Stein recipients present, in addition to Mr. Brophy, were C. George Dandrow, '22, and Alfred T. Glassett, '20.

M.I.T. Club of Washington: New Officers

Annual elections of the M.I.T. Club of Washington have resulted in the following choices for new officers for 1967-1968: John J. Phillips, Jr., '38, President; Frank G. Klear, '27, First Vice-president; Robert H. Wilkie, '53, Second Vice-president; Lawrence W. Conant, '21, Third Vice-president; and Milton E. Essoglou, '55, Secretary. Stephen B. Parkoff, '59, was reelected Treasurer, and William G. Osmun, '40, will continue as Publicity Manager.

The election was held on June 4, and the new officers have since been charting a course for continuing and new activities for all M.I.T. in the Washington area beginning next fall.—William G. Osmun, '40, A.T.A., 1000 Connecticut Avenue, N.W., Washington, D.C. 20036.

M.I.T. Club of Lehigh Valley: Growing Skills Crisis

Nathaniel H. Frank, '23, Professor of Physics at M.I.T., called for a change in educational structure and cited two major weaknesses in today's vocational education for members of the M.I.T. Club of Lehigh Valley on May 4.

"Vocational education is built on a philosophy that is self-limiting," he said, "and it is very low on the scale of social values. It is skill training. As long as that skill is in demand, you are in great shape. But when it diminishes, you have to start all over again."

"In 10 years, half of the persons working on jobs will be working on jobs that now do not exist," he said. "We have organized the disciplines of man into neat packages. We forget they are arbitrary and man-made."

Dr. Frank maintained contemporary education is inadequate in supplying the skills needed for today's technological society and deplored the division of education into the broad terms "vocational-technical" and academic.

He added: "The worst thing about academic education is that it only leads to one avenue—college. If you fail, there are no alternatives."—*Easton Express*

M.I.T. Alumni Association of Utah: The Use of Computers at M.I.T.

Dean L. Jacoby, '54, Director of M.I.T.'s Office of Institutional Studies, was the M.I.T. Alumni Association of Utah's guest speaker at the Alta Club in Salt Lake City on Friday, April 21. This presentation, reporting the extent of computer usage at M.I.T. by students and staff for teaching, research, and administration, was of great interest to the small audience.

The guests included nine members of the Board of Governors of the Club, five other Alumni, eight wives of Alumni, and two couples who are parents of current M.I.T. students—one from American Fork, Utah, and the other from Ogden.

The Club will meet again in the fall, and in the meantime the attention of the Board of Governors will focus on stimulating interest and attendance at future club events. There is also pending an inquiry by the M.I.T. Symphony Orchestra regarding a performance in Salt Lake City in 1969.—T. R. Fuller, '58, President, 1808 Kennecott Building, Salt Lake City, Utah, 84111.

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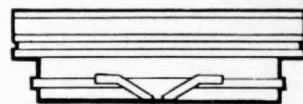
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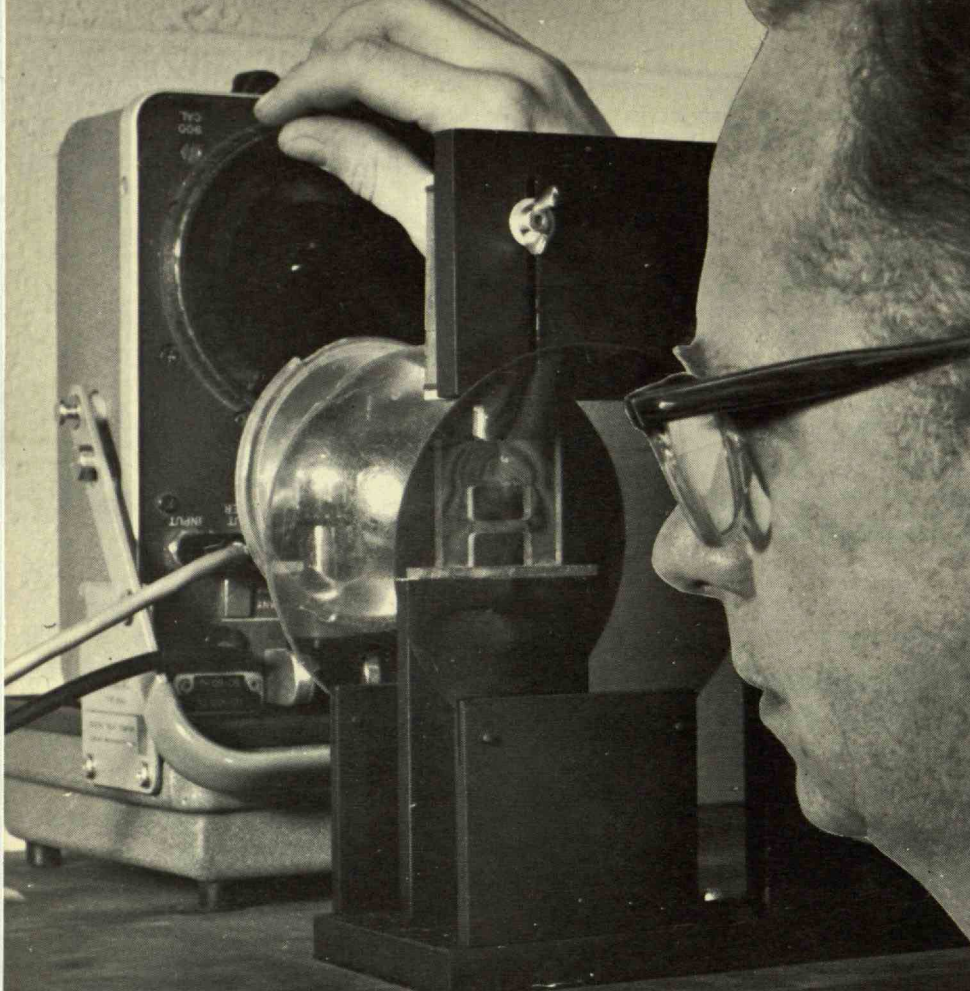


Photo courtesy Allied Research Associates, Inc., Concord, Mass.

An inside look at stress

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